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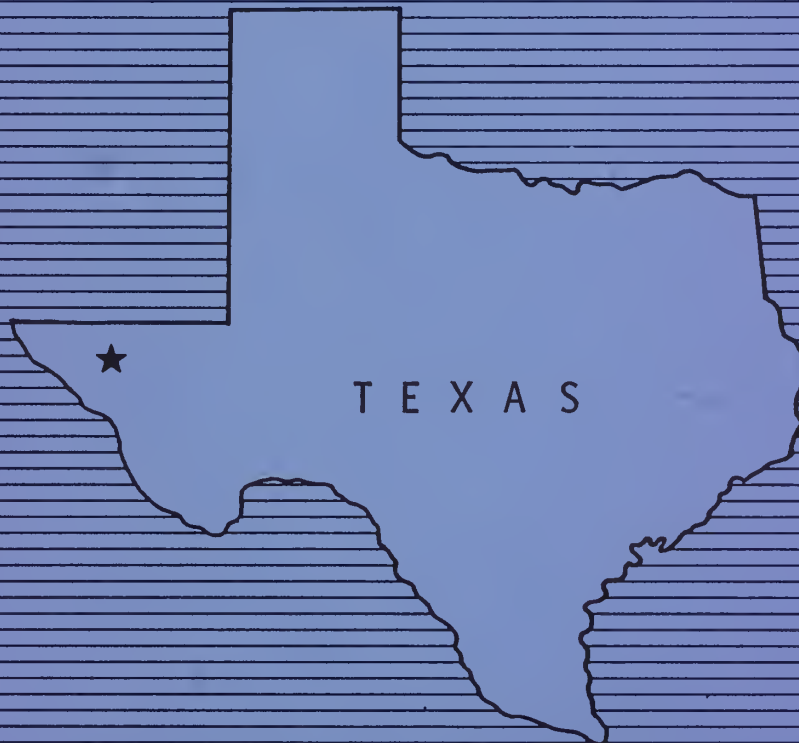
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FINAL
ENVIRONMENTAL IMPACT STATEMENT

USDA-SCS-EIS-WS-(ADM)-75-4 (F) TX

THREE MILE & SULFUR DRAW
WATERSHED PROJECT

CULBERSON and HUDSPETH COUNTIES, TEXAS



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USDA-SCS-ES-WS(ADM)-75-4(F)TX

THREE-MILE AND SULFUR DRAW WATERSHED PROJECT

CULBERSON AND HUDSPETH COUNTIES, TEXAS

FINAL ENVIRONMENTAL IMPACT STATEMENT

George C. Marks, STATE CONSERVATIONIST
Soil Conservation Service

Sponsoring Local Organizations:

High Point Soil and Water Conservation District
P. O. Box 278, Van Horn, Texas 79855

Culberson County Commissioners Court
County Courthouse
Van Horn, Texas 79855

City of Van Horn
Van Horn, Texas 79855

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Soil Conservation Service
Temple, Texas 76501

6. Expenses and inconveniences associated with interruption or delay of travel, rerouting of school buses and mail routes, disruption of farm operations, and business losses due to flooding will be eliminated or greatly reduced.
7. About 110 residential units in Van Horn will be provided protection from a flood having a predicted recurrence interval of once every 100 years.
8. Water from sediment pools of the floodwater retarding structures will provide an intermittent water supply for livestock.
9. Irrigation systems and equipment in Wild Horse farming area will be protected from damage or destruction caused by erosion, sediment, or floodwater.
10. Wildlife in the watershed will be affected as follows:
 - a. Two limited and temporary sources of drinking water would be provided by sediment pools following construction of planned structures.
 - b. If there should be water impounded in the sediment pools during the spring and fall months, resting areas would be provided for migrating waterfowl.
 - c. With the availability of more water in and around the floodwater retarding structures and diversion, more desirable and dense vegetation can be established offering improved wildlife habitat.
 - d. The habitat of ground-nesting birds and other lowland wildlife species will be improved with the reduction in severity and frequency of floods.
 - e. Land treatment measures such as proper grazing use, deferred grazing, and livestock watering installations designed for wildlife use will benefit wildlife by improving habitat and increasing the amount and distribution of water.
 - f. Upland wildlife habitat of minimal value on 48 acres in the sediment pools will be lost; habitat of similar value will be temporarily destroyed on 86 acres needed for auxiliary borrow areas and 382 acres required for installation of the floodwater diversion.
11. An impetus for a higher quality of living and social upgrading will be provided through reduced flood damages.
12. Increased economic activity will create the equivalent of 20 permanent jobs for local residents.
13. Construction of the structural measures will create approximately 43 man-years of employment.
14. Public and private funds presently used to repair flood damages can be shifted to more permanent investments that improve the quality of living.
15. Significant intangible public health benefits will accrue to residents in the city of Van Horn which will include reduced hazards to loss of life and injury, elimination of health hazards associated with damage to water supply and waste

disposal systems, and the prevention of other factors accompanying floods which tend to disrupt the maintenance of public health facilities.

16. Dust and sediment pollution will increase during construction of the structural works of improvement.
17. Forage for approximately three animal units of livestock will be temporarily destroyed in the areas required for construction of dams, emergency spillways, borrow areas, and the diversion.
18. Eight archeological sites, none of which are considered eligible for nomination to the National Register of Historic Places, will be affected by either disturbance during construction or occasional inundation by floodwater.

VI. List of Alternatives Considered:

1. Land treatment only
2. Changing the present use of agricultural land to a use less susceptible to damage by flooding, application of land treatment, and purchase of flood prone areas with relocation of homes and improvements
3. Floodproofing of buildings and other improvements and, as in Alternative No. 2, change in agricultural land use and applying land treatment
4. Altering the existing floodwater diversion protecting Van Horn or constructing a new floodwater diversion and, as in Alternative No. 2, changing the agricultural land use in the flood prone area and applying land treatment
5. Foregoing the implementation of a project

VII. Agencies From Which Comments Have Been Received:

U.S. Department of the Army; U.S. Department of the Interior; U.S. Department of Health, Education, and Welfare; U.S. Department of Transportation; Environmental Protection Agency; Advisory Council on Historic Preservation; Division of Planning Coordination (State agency designated by Governor and State Clearinghouse); West Texas Council of Governments (Regional Clearinghouse), and National Audubon Society.

VIII. Draft Environmental Impact Statement transmitted to CEQ on April 14, 1975.



USDA SOIL CONSERVATION SERVICE

FINAL ENVIRONMENTAL IMPACT STATEMENT

for

THREE-MILE AND SULFUR DRAW WATERSHED

Culberson and Hudspeth Counties, Texas

Installation of this project constitutes an administrative action. Federal assistance will be provided under authority of Public Law 83-566, 83rd Congress, 68 Stat. 666, as amended.

SPONSORING LOCAL ORGANIZATIONS

High Point Soil and Water Conservation District
Culberson County Commissioners Court
City of Van Horn

PROJECT OBJECTIVES AND PURPOSES

An initial study was made by representatives of the Soil Conservation Service and sponsoring local organizations to determine watershed problems and possible solutions. After determining the location and extent of the problems and discussing potential solutions, project objectives were formulated. Watershed protection and flood prevention were the primary objectives expressed by the sponsors. The initial intention of the sponsors in regard to flood prevention was to provide protection to the Wild Horse farming area. The control of floodwater originating in the drainage area of Three-Mile Draw is necessary to obtain the desired level of protection. When it became apparent that a floodwater retarding structure would be required, the sponsors realized that additional flood protection for the city of Van Horn could be attained with a minimum of additional cost to that needed to protect the agricultural area. The sponsors then included among the objectives of the project the intent to provide flood protection for urban areas of Van Horn. The sponsors also wished to consider the feasibility of including additional water storage for recreational purposes in a floodwater retarding structure on Three-Mile Draw.

In addition to expressing the desire for establishment of a complete program for soil and water conservation on the watershed, the following specific objectives were agreed to:

1. attain adequate treatment, by the end of a five-year project installation period, on at least 85 percent of the watershed through the application and establishment of land treatment measures,

2. attain a reduction of 70 to 75 percent in average annual flood damage to agricultural flood plain lands,
3. attain at least a 95 percent reduction in average annual flood damages in Van Horn with consideration given to a flood having a predicted recurrence interval every 100 years, and
4. develop facilities and provide opportunities for public water-based recreation.

The sponsors considered the impacts, both favorable and adverse, in developing the plan for meeting the project objectives. The objectives selected were those that would contribute to the conservation, development, and productive use of the watershed's soil, water, and related resources so that watershed residents can enjoy:

QUALITY IN THE NATURAL RESOURCE BASE FOR SUSTAINED USE

QUALITY IN THE ENVIRONMENT TO PROVIDE ATTRACTIVE, CONVENIENT, AND SATISFYING PLACES TO LIVE, WORK, AND PLAY

QUALITY IN THE STANDARD OF LIVING BASED ON COMMUNITY IMPROVEMENT AND ADEQUATE INCOME

The sponsors selected measures which will help to achieve these objectives and also included measures to minimize adverse impacts wherever practicable.

PLANNED PROJECT 1/

Land Treatment

Conservation of soil, water, and plant resources is the basic element of a watershed protection and flood prevention project. Treatment and use of land within the watershed largely determines the degree to which conservation objectives are attained. The function and useful life of structural measures such as floodwater retarding structures and floodwater diversions are directly dependent upon the adequacy of conservation measures applied to the upstream land resource. These measures are applied on a voluntary basis with needed technical assistance from agencies having assigned responsibility in natural resource conservation. Most land users realize the necessity of applying conservation measures to conserve the natural resource base on which their livelihood depends. Application of land treatment measures provides increased income for present land users and protects basic resources for the use of future generations.

1/ All information and data, except as otherwise noted by reference to source, were collected during watershed planning investigations by the Soil Conservation Service, U.S. Department of Agriculture.

Conservation land treatment consists of individual measures and practices or a combination of measures and practices that are planned, installed, and maintained on privately owned land by individuals or groups of land users or by local organizations. Land treatment measures planned for the watershed are those that will contribute directly to the preservation and enhancement of the environment in the watershed. Emphasis will be given to those measures which will reduce soil and water losses, assure proper functioning of the planned structural measures, reduce flooding, and preserve or improve wildlife resources of the watershed.

Conservation land treatment has been or will be applied on privately owned lands within the watershed. The land user will make the decision on the use of his land and the treatment measures which he will install.

In addition to effectively maintaining land treatment measures already established, it is planned to establish or complete the installation of needed land treatment measures on about 5,600 acres of cropland, 20,800 acres of rangeland, and 20 acres of pastureland. These land treatment measures are to be applied during a five-year installation period as indicated in the following schedule:

| Land Use | Fiscal Year | | | | | Total |
|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| | 1st | 2nd | 3rd | 4th | 5th | |
| | (acres) | (acres) | (acres) | (acres) | (acres) | (acres) |
| Cropland | 1,110 | 1,110 | 1,120 | 1,130 | 1,130 | 5,600 |
| Rangeland | 4,150 | 4,150 | 4,150 | 4,150 | 4,200 | 20,800 |
| Pastureland | - | 10 | 10 | - | - | 20 |
| TOTAL | 5,260 | 5,270 | 5,280 | 5,280 | 5,330 | 26,420 |

This schedule may be changed from year to year to conform with accomplishments and any mutually desirable changes.

Conservation cropping systems involve growing crops in combination with needed cultural and management measures that reduce erosion and protect the soil. Crop residue management utilizes plant residue left on or near the soil surface to protect cultivated lands during critical erosion periods. Irrigation land leveling is the reshaping of the land surface to be irrigated to planned grades. Irrigation systems involve the installation of water control structures for the efficient distribution of irrigation water. Irrigation water management is accomplished by determining and controlling the rate, amount, and timing of irrigation water application to soils to supply plant water needs in a planned and efficient manner. A diversion is a channel with a supporting ridge on the lower side constructed across the slope of a field and is designed and located to protect land from erosion producing storm runoff from adjacent areas.

Rangeland will be managed to maintain or improve existing vegetation. Conservation measures to be applied on rangeland include proper grazing use, planned grazing systems, and deferred grazing. Wells, troughs, and pipelines for additional livestock water will be installed. Proper grazing, planned grazing systems, and deferred grazing are range management practices which involve the grazing of forage plants at periods of time and at intensities which are compatible with the physiological needs of plants. Application of these practices assures the continued growth and survival of desired plant species.

Wildlife upland habitat management will be applied on 8,800 acres of rangeland which is used as wildlife-recreation land. About 70,000 acres of land within the watershed will be managed for domestic livestock and wildlife use. Wildlife upland habitat management will consist primarily of protecting plants which have value to wildlife from overuse by domestic livestock. This will be done by limiting the number of livestock on areas where they would compete with wildlife for forage. To help assure adequate food supplies for deer, it is particularly important that any grazing by domestic sheep be minimized. Longer periods of deferred grazing by livestock will also be instrumental in wildlife upland habitat management. Land users who install or relocate livestock watering systems will be encouraged to construct them in a manner which will furnish water for livestock and wildlife.

Financial assistance is available to land users through the Rural Environmental Conservation Program administered by the Agricultural Stabilization and Conservation Service on a cost-share basis for installation of needed land treatment measures.

Land users will continue to install and maintain conservation measures needed in the watershed following the installation period. With the installation of the planned land treatment, 88 percent of the watershed will be adequately protected. Land is considered to be adequately protected when conservation measures essential to its protection have been applied.

Structural Measures

A system of two floodwater retarding structures and approximately 55,000 feet of floodwater diversion will be constructed in the Three-Mile and Sulfur Draw Watershed. Figure 1 shows a section of a typical floodwater retarding structure.

Figure 2 shows a typical cross section of a floodwater diversion. Figure 3 is the plan view of the floodwater diversion included in the project. The locations of all the structural measures to be installed are shown on the Project Map, Appendix B.

A floodwater retarding structure is an earth dam or embankment with a principal spillway and plunge basin, an emergency spillway, a floodwater

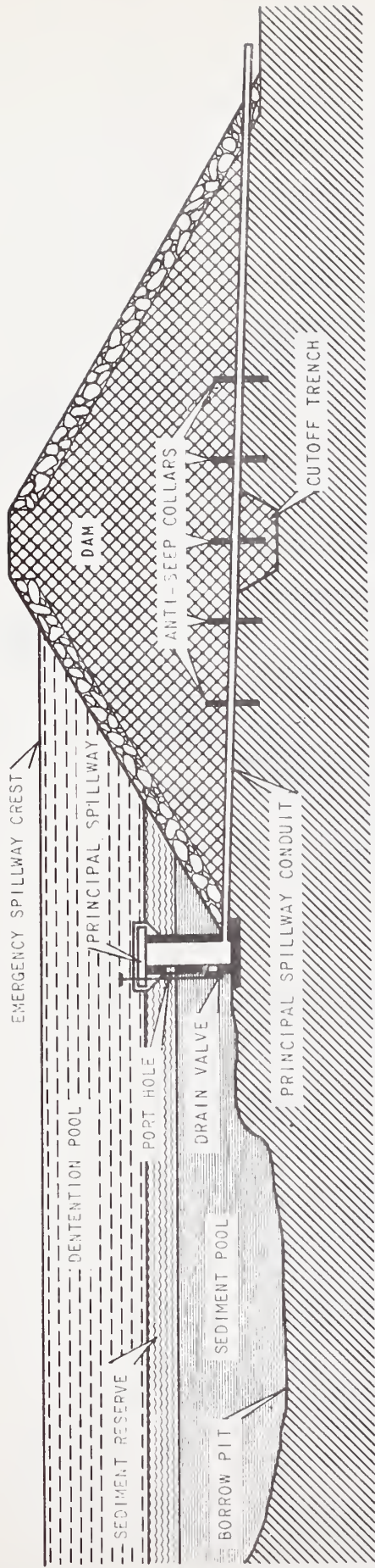


Figure 1
SECTION OF A TYPICAL FLOODWATER RETARDING STRUCTURE

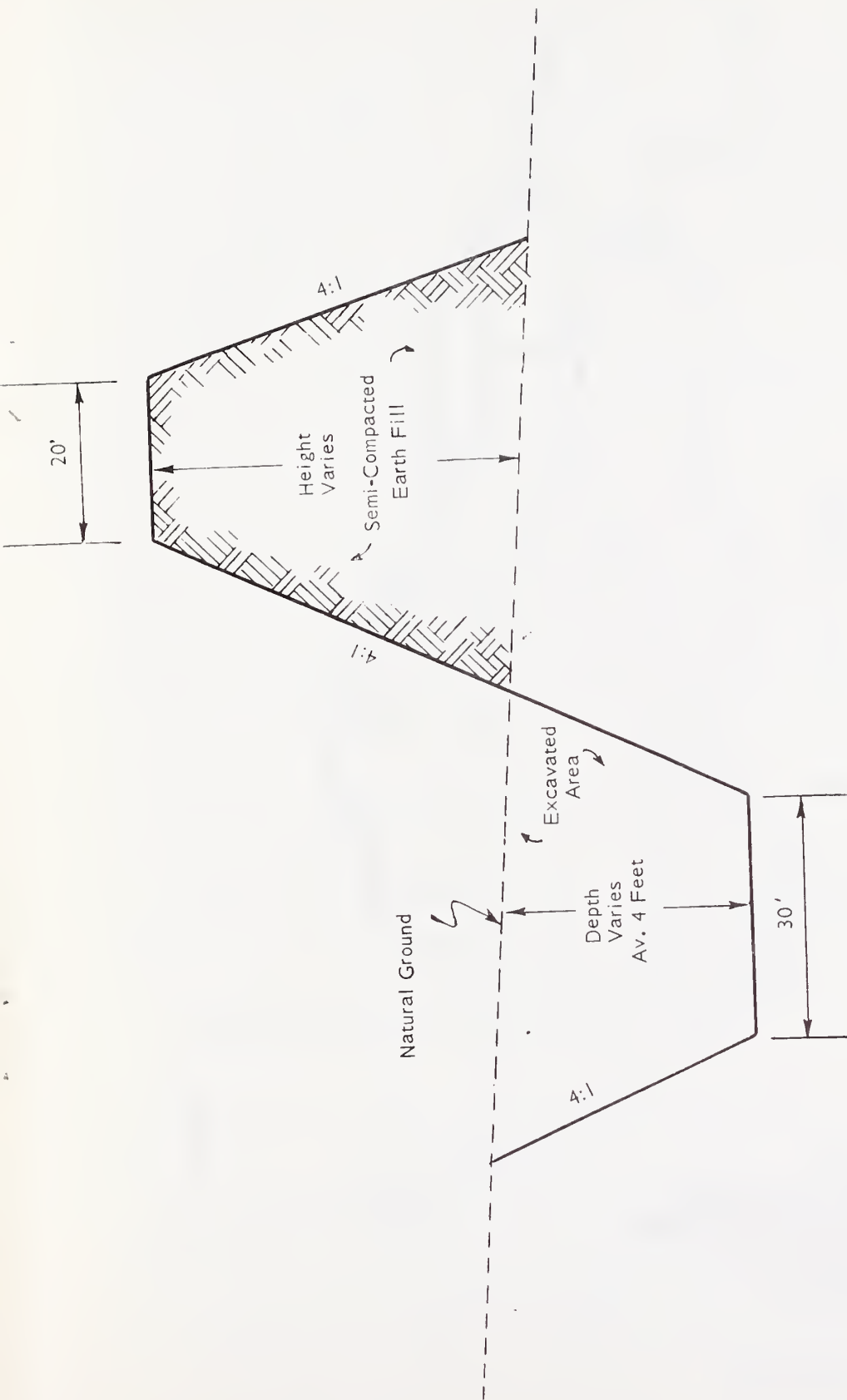


Figure 2
 TYPICAL CROSS SECTION
 FLOODWATER DIVERSION
 THREE-MILE AND SULFUR DRAW WATERSHED
 HUDSPETH AND CULBERSON COUNTIES, TEXAS

U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE
 Temple, Texas

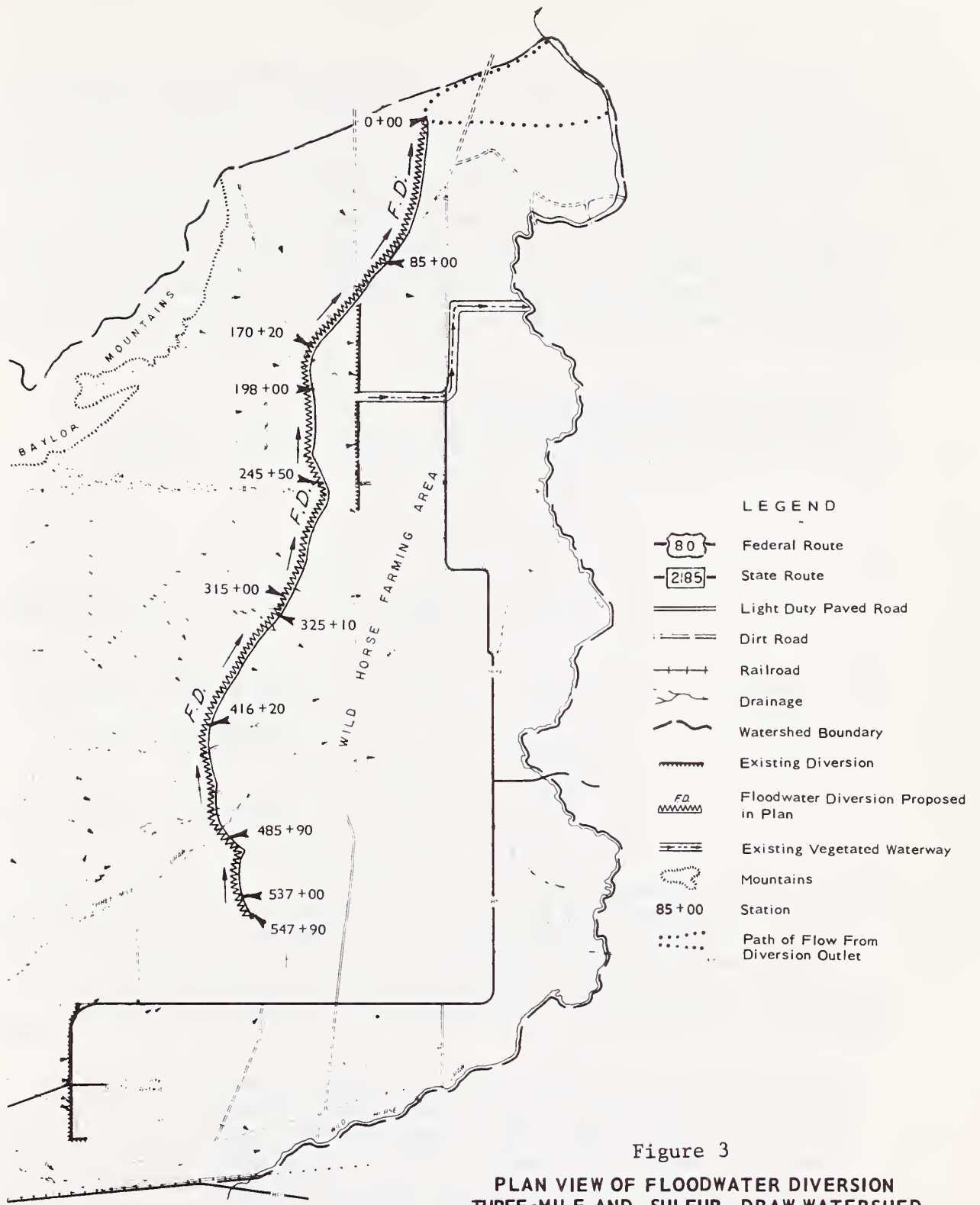


Figure 3

**PLAN VIEW OF FLOODWATER DIVERSION
THREE-MILE AND SULFUR DRAW WATERSHED
CULBERSON COUNTY, TEXAS**

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
TEMPLE TEXAS

Base compiled from USGS Quadrangle sheets (Polyconic projection) and latest General Highway Maps. All planimetric features, latitude and longitude and state coordinates taken from these sources.

retarding pool, and a sediment pool. The function of the embankment is to temporarily impound floodwater upstream in the retarding pool. The water in the retarding pool flows, during a predetermined period, through the principal spillway which is a concrete vertical inlet and conduit through the base of the embankment. Principal spillway flow is released into a plunge basin on the downstream side of the embankment. The plunge basin dissipates the energy of the principal spillway flow. The emergency spillway is designed to convey runoff that exceeds the planned capacity of the floodwater retarding pool past the embankment and back to the stream channel. The sediment pool is capacity below the principal spillway elevation allocated for storage of sediment expected to accumulate during a 100-year period.

| Parameter | : Unit | : Floodwater Retarding Structure | |
|---|--------|----------------------------------|---------|
| | | No. 1 | : No. 2 |
| Height of Dam | ft. | 79 | 52 |
| Length of Dam | ft. | 1,800 | 1,610 |
| Sediment Pool - lowest ungated outlet | acres | 17 | 31 |
| Floodwater Retarding Pool and Sediment Reserve Pool | acres | 56 | 203 |
| Area in Dam and Emergency Spillway | acres | 25 | 53 |
| Average Depth of Sediment Pool | ft. | 11.8 | 6.5 |

The planned floodwater retarding structures will temporarily store or retard an average of 1.52 inches of runoff from 36.08 square miles of drainage area. These structures will control runoff from approximately 24 percent of the watershed. The total storage capacity of the floodwater retarding structures is 3,645 acre-feet, of which 720 acre-feet are for sediment storage and 2,925 acre-feet are for floodwater retarding storage.

The floodwater retarding structures are designed to store submerged and aerated sediment. Crests of the principal spillways will be set at the elevation of the 100-year sediment pool. Principal spillways for both structures will be ported, as required by Texas Water Rights Statutes, at elevations which will limit each impoundment to 200 acre-feet including borrow. This will initially provide a total of 400 acre-feet of storage capacity below the lowest ungated spillway openings. Both floodwater retarding structures will have provisions to release impounded water in order to perform maintenance, and if it becomes necessary, to avoid

encroachment upon any downstream water rights as may be granted by the Texas Water Rights Commission. According to the "Catalog of Water Oriented Data, Volume 23, Rio Grande Basin, 1972," compiled by the Water Oriented Data Programs Section of the Interagency Council on Natural Resources and the Environment, there are no water rights permits issued for use of watershed runoff.

Major factors which will affect construction of both floodwater retarding structures will be rock excavation in emergency spillways, zoning of available borrow material within embankments, lack of suitable quantity of borrow material at the sites where the structures are to be constructed, and lack of adequate on-site supply of water for construction. Permeable zones of gravel within the embankment foundation will also affect construction of Floodwater Retarding Structure No. 2.

Floodwater Retarding Structure No. 1 will be located entirely on bedrock. The rock in the immediate area of the site is a slightly metamorphosed, very fine-grained, massive, indistinctly bedded, maroon sandstone. This sandstone has been faulted approximately 0.3 mile downstream and 0.7 mile upstream from the centerline of the dam. The faults trend generally in a northwest-southeast direction. Calcite-filled joints and cracks are present in the immediate area of the site. These conditions are not expected to cause unusual construction problems. However, embankment drainage measures have been included for the structure.

The principal spillway will be a monolithic rectangular reinforced concrete inlet and a prestressed concrete-lined steel cylinder pipe outlet barrel on a noncompressible bedrock foundation. The pipe outlet barrel will discharge overflow into a rock-lined plunge basin. The lowest ungated outlet of the principal spillway is designed at the 200 acre-foot elevation of the sediment pool. No allowance was made for borrow in determining this elevation because little or no earth materials are available in the sediment pool.

Suitable borrow material for the dam is very limited in the sediment and retarding pool areas of Floodwater Retarding Structure No. 1. A small amount of gravelly terrace material is located upstream from the site but it is so limited in quantity it is insignificant for construction purposes. It will be necessary to obtain fine-grained material downstream from the site. Auxiliary borrow areas totaling 66 acres are located about 1.5 miles downstream from the site. This area will furnish, as classified with the Unified Soils Classification System, sandy and gravelly, calcareous clay (CL) with lesser amounts of clayey gravel (GC).

It is estimated that 100 percent of the required excavation in the emergency spillway area, 38,640 cubic yards, will classify as rock. This material will be used as a rock blanket on the embankment.

The material at finished grade in the entire emergency spillway area will be erosion-resistant rock. The principal spillway capacity and

floodwater detention storage will provide a one percent chance for emergency spillway use.

Streamflow to the location of Floodwater Retarding Structure No. 1 is considered to be ephemeral. There are some very small springs or seeps upstream that yield minimal amounts of water, of which most is lost to evaporation.

Sandstone bedrock crops out in the abutments on the site of Floodwater Retarding Structure No. 2. However, much of this rock is covered with alluvial and colluvial material. On the right abutment, the unconsolidated material ranges in size from clay to large boulders. This material will have to be removed to insure stability of the dam near the right abutment. The valley floor and flood plain are covered with deposits of lenticular fine grain sand, silty sand and gravel, and sandy clay. Stratigraphic investigations with a portable seismograph indicate these deposits are between 15 and 40 feet thick. These materials in the foundation area of the dam have low settlement potential and high shear strength. Due to the permeable nature of these soil materials, foundation drainage measures were incorporated into the structure design to control seepage and possible excessive pore pressures. Sandstone bedrock also crops out in the lower elevations of the left abutment, but is obscured by approximately seven feet of unconsolidated material on and near the top of the hill and emergency spillway area.

Approximately 27 percent of the 192,200 cubic yards of required emergency spillway excavation will classify as rock. By using selective placement and zoning, this rock and the common sandy clay (CL), silty sand (SM), and silty gravel (GM) material will be suitable for embankment fill. The material at finished grade in the control or crest section will be erosion resistant sandstone bedrock. The material at finished grade in the exit channel will consist of sandy and silty clay (CL), silty sand (SM), and clayey gravel (GC). The principal spillway capacity and floodwater retarding storage will provide a one percent chance for emergency spillway use.

The sediment pool area will yield an estimated 195,000 cubic yards of sandy silty clay (CL), clayey sand (SC), and silty gravel (GM). An auxiliary borrow area of about 20 acres approximately 0.5 mile downstream from the centerline of the embankment is available and will furnish ample materials similar to those in the sediment pool.

The principal spillway for Floodwater Retarding Structure No. 2 will be a monolithic rectangular reinforced concrete inlet, and a prestressed concrete-lined steel cylinder pipe outlet barrel on a compressible soil foundation. Principal spillway flow will discharge into a rock-lined plunge basin.

The sediment pool of the structure will initially have the capability to impound 200 acre-feet of water below the lowest ungated outlet of the

principal spillway. It is anticipated that removal of earth fill materials from the sediment pool for the dam will create 31 acre-feet of the total 200 acre-feet capacity.

Streamflow above and below the site is ephemeral.

The only record of an earthquake in the area was in 1931. The lack of sufficient earthquake data makes it practically impossible to predict the magnitude and frequency of earthquakes. However, special considerations were made in the planning and designing of the earth dams. The emergency spillways have adequate capacity to pass flows created by major landslides into the reservoirs. Protection against embankment failures caused by cracking will be achieved by selectively placing the materials for the dam and proper foundation preparation. The materials most resistant to piping will be placed in the center zone of the dams, and materials that lend themselves to sealing and controlling leakage will be placed in large transition zones downstream from the center zone.

Ground water will be used for construction purposes due to inadequate volumes of available surface water. Numerous cropland irrigation wells in the vicinity indicate the availability of adequate amounts of ground water. A flooded, abandoned copper mine about 2.5 miles upstream from the centerline of Floodwater Retarding Structure No. 1 is another possible source of water for construction. Water from the mine would be either hauled or pumped through pipe to the floodwater retarding structure sites where it would be sprinkled on soil materials as they are placed on the dams under construction. Water is needed in conjunction with mechanical rollers to obtain the most desirable degree of compaction of soil materials to be used in the dams. Water will also be sprinkled as needed on haul roads, excavation areas, etc. to suppress dust. The means of transport, quantity needed, and the application and use will not cause stream pollution from water that is probably contaminated with acid mine wastes.

Floodwater Retarding Structures Nos. 1 and 2 will have the capacity at the lowest ungated outlets to impound 17 and 31 surface acres of water respectively. The quality of water impounded is anticipated to be adequate for fish habitat. However, due to a low amount of annual precipitation, high evaporation rate, and anticipated filling of the pools with sediment, the impoundments are not expected to be dependable habitat for a fisheries resource. Water budget studies made during planning yielded data which supercedes the "preliminary data" referred to by the Fish and Wildlife Service. The water budget studies data indicate the sediment pools will initially contain sufficient water to be suitable fish habitat on an average of two out of every five years. The two years with suitable habitat will not necessarily be consecutive. It is possible the sediment pools will be completely dry during times of drought. The depletion of the pools' capacities by sediment accumulations will further reduce the dependability of suitable fish habitat.

It is anticipated that stocking of the floodwater retarding structures' sediment pools will not be feasible or practical in view of the expected frequency with which fish populations will be lost due to inadequate water supplied.

Presently the sponsoring local organizations have no plans for developing a fishery or any kind of recreational facility at either of the floodwater retarding structure sites, nor do they intend to provide public access to the sites. Present conditions and plans do not warrant the installation of sanitary facilities; however, prior to any public use of water that might be impounded at some future time, the sponsors will provide adequate sanitary facilities approved by the Texas Health Department and appropriate local health agencies.

Installation of floodwater retarding structures will require a change in location or modification of known existing improvements as follows: county road at Site No. 2; private roads at Sites Nos. 1 and 2; and fences at Site No. 2. All costs for necessary changes of location or modifications as listed will be borne by the sponsoring local organizations.

The floodwater diversion will consist of excavation and semi-compacted earth fill approximately 55,000 feet in length. It will have a bottom width of 60 feet and the depth of excavation will average about 4.0 feet. The floodwater diversion will be constructed with 4:1 side slopes in the excavated and levee portions for its entire length.

The material through which the floodwater diversion will be excavated consists of clay, silt, silty sand, clayey gravel, and silty gravel.

The planned design 100-year frequency discharge, 3,160 cubic feet per second, was selected from peak discharge computations, using Soil Conservation Service Engineering and Watershed Planning Technical Guide No. 18. Runoff Condition Curve No. II was selected for design of top of berm elevation with an added 2.0 feet freeboard. Runoff Condition Curve No. I was selected for allowable velocity design. Runoff condition curve numbers refer to antecedent moisture conditions of the soil. Curve No. I conditions are such that soils are dry enough for satisfactory plowing or cultivation to be accomplished. This condition has the lowest potential for runoff. Curve No. II is an average condition. Soils under Curve No. III condition are practically saturated and have the highest potential for runoff.

Two sections of the diversion are designed to control the locations of overtopping and breaching when storm events occur creating runoff in excess of the diversion's capacity. These sections, located at stations 198+00 and 315+00 (figure 3), will be approximately 100 feet in length and have a top elevation of 0.5 foot less than that of the diversion on each end of the sections.

Included as an integral part of the floodwater diversion is a small protective levee, around a ranch headquarters (figure 3, station 170+20). This small levee will have a maximum height of three feet and is designed with a drainage pipe and a flap gate. The levee will provide protection for the ranch headquarters from runoff being conveyed by the floodwater diversion. This protection will extend to an elevation of 3,763.7 feet mean sea level or to at least the elevation of the top of the floodwater diversion, whichever is greater.

Water discharged from the diversion will flow on to a broad flat area presently being used as rangeland. The discharge will flow generally in an east north-easterly direction for about two miles and confluence with Wild Horse Draw (figure 3). Soil materials in the area are mostly clay and silty clay with minor amounts of sandy and gravelly clay plated with gravel and cobbles. Erosion is not expected to be significant on this area. Once discharged from the diversion, water flowing over the area will be of the overland type with shallow depths and relatively slow velocities.

Installation of the floodwater diversion will require a change of location or modification of known existing improvements as follows: fencing, private ranch road, and county road. All costs for necessary changes of location or modifications as listed will be borne by the sponsoring local organizations.

Areas requiring soil erosion control as a result of construction of the floodwater retarding structures and diversion will be protected by the use of rock riprap and gravel blankets. It is anticipated that materials for rock riprap will be available from on-site sources. However, gravel material may have to be obtained from commercial sources.

Due to climatic conditions, it is impractical to plan vegetative measures on structures for erosion control. Low average annual rainfall (about 10 inches) and high temperatures (atmospheric and soil) are the principal factors. It is not uncommon for temperatures during the summer to exceed 100 degrees Fahrenheit. When atmospheric temperatures rise to this degree, soil temperatures can be expected to exceed 145 degrees Fahrenheit. These temperatures are far above the 110 to 120 degree range at which seedlings usually die. During the winter months seasonal precipitation is generally low, creating an adverse condition insofar as available soil moisture is concerned. If vegetation was established under conditions of above average rainfall or with irrigation, it could not be expected to be dense enough to effectively control erosion. Under climax or excellent conditions in this area, the distance between plants range from 8 to 24 inches.

All applicable state laws will be complied with in the design and construction of all structural measures as well as those pertaining to the storage, maintenance of quality, and use of water.

During construction, contractors will be required to adhere to strict standards set forth in each construction contract to protect the environment by minimizing soil erosion, and water and air pollution. These standards will be in compliance with U.S. Department of Agriculture, Soil Conservation Service Engineering Memorandum 66, "Guidelines for Minimizing Soil Erosion and Water and Air Pollution During Construction." Excavation and construction operations will be scheduled and controlled to prevent exposure of extraneous amounts of unprotected soil to erosion and the resulting translocation of sediments. Measures to control erosion will be uniquely specified at each work site and will include, as applicable, use of temporary vegetation or mulches, diversions, mechanical retardation of runoff, and traps. Harmful dust and other pollutants inherent to the construction process will be held to minimum practical limits. Haul roads and excavation areas, and other work sites will be sprinkled with water as needed to keep dust within tolerable limits. Contract specifications will require that fuel, lubricants, and chemicals be adequately labeled and stored safely in protected areas, and disposal at work sites will be by approved methods and procedures. Clearing and disposal of brush and vegetation will be carried out in accordance with applicable laws, ordinances, and regulations in respect to burning. Each contract will set forth specific stipulations to prevent uncontrolled grass or brush fires. Disposal of brush and vegetation will be by burying, hauling to approved off-site locations, or controlled burning, as applicable.

Stringent requirements for safety and health in conformance with the Construction Safety Act will be included in each construction contract.

Necessary sanitary facilities, including garbage disposal facilities, will be located to prohibit such facilities from being a pollution hazard to live streams, wells, or springs in conformance with Federal, State, and local water pollution control regulations. Special provisions in each construction contract will incorporate by reference, and thereby make the contract provisions conform to "Safety and Health Regulations for Construction, Part I and Part II," U.S. Department of the Interior, Bureau of Reclamation. Soil Conservation Service guidelines that provide for the incorporating of the Bureau of Reclamation regulations into construction contracts are in the "Soil Conservation Service Administrative Services Handbook, Chapter 6." Conformance to all environmental control requirements will be monitored constantly by a construction inspector who will be on-site during all periods of construction operation.

The watershed work plan has been coordinated with the Texas Historical Commission and the National Park Service, USDI. The installation of the project will not encroach upon any known historic places or interfere with any planning for historic preservation by the Commission.

Investigations by the Archaeology Research Program, Southern Methodist University, indicate that construction of the structural measures

included in the project will affect eight archeological sites, none of which are considered eligible for nomination to the National Register of Historic Places. Three other sites, not considered eligible for nomination, are located within the area surveyed but will not be affected by construction or inundation.

Two archeological sites designated X41CU3 and X41CU9 will be affected by Floodwater Retarding Structure No. 1. Two archeological sites designated X41CU10 and X41CU11 will be affected by Floodwater Retarding Structure No. 2. Site X41CU11, is not located within the construction or pool area. However, it could be accidentally disturbed by movement of construction equipment unless proper precautions are taken. The site will be prominently flagged to prevent encroachment by construction equipment and personnel. Four archeological sites designated X41CU1, X41CU6, X41CU7, and X41CU8 will be affected by construction of the floodwater diversion.

Investigating archeologists recommend that no further work be undertaken at these sites. This recommendation is concurred in by the State Historic Preservation Officer.

The unpublished reports, "Prehistoric Archeology in the Three-Mile and Sulphur Draw Watershed" November 1973 and "Prehistoric Settlement in the Three-Mile and Sulphur Draw Watersheds," October 1975, Archaeology Research Program, Department of Anthropology, Southern Methodist University, contain additional details relative to the archeological sites surveyed. These reports are available for review at the State Office, Soil Conservation Service, First National Bank Building, Temple, Texas 76501.

If cultural values are discovered during construction, the Soil Conservation Service will immediately consult with the National Park Service to determine whether there is substantive factual evidence to warrant a decision to undertake detailed surveys and recovery. If the evidence is substantive, and at the request of the National Park Service, construction will be stopped to undertake immediate surveys and recovery. If the evidence is inconclusive, construction will continue with caution.

Land Use Changes

The minimum land rights required will be those necessary to construct, operate, maintain, and inspect the works of improvement; to provide for flowage of water in, upon, or through the structures; and provide for the permanent storage and temporary detention, either or both, of any sediment or water.

Under present conditions, no farm or ranch operation, business, or person will be displaced by installation of the planned floodwater retarding structures and the floodwater diversion. However, if relocations or displacements become necessary, they will be carried out in compliance with Public Law 91-646, Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

A total of 1,781 acres of land will be needed for installation and proper functioning of the floodwater retarding structures and floodwater diversion. The dams and emergency spillways will require 78 acres; sediment pools, 68 acres (48 acres below the lowest ungated outlets); floodwater retarding pools, 239 acres; and auxiliary borrow areas, 86 acres. The floodwater diversion will require a total of 1,378 acres. The diversion will be installed on 382 acres. Flowage easements will be obtained on 996 acres. Of this 996 acres, 346 acres will be above and adjacent to the diversion and 650 acres will be between station 0+00 and Wild Horse Draw (figure 3).

Approximately 594 acres will be cleared of all existing woody vegetation for the construction of dams (included are 86 acres for auxiliary borrow areas), emergency spillways, sediment pools below the lowest ungated outlets, and the floodwater diversion. Except for occasional and temporary inundation, the 191 acres to be used for sediment reserve and floodwater retarding pools will not be disturbed. The vegetation on 996 acres on which flowage easements will be obtained will not be disturbed during construction. However, this area will be subject to occasional inundation.

The 1,781 acres required for construction and functioning of the structural measures are primarily rangeland in poor condition. The dominant vegetation is creosotebush (Larrea divaricata) and lecheguilla (Agave lecheguilla). 1/

Operation and Maintenance

Planned land treatment measures will be operated and maintained by landowners and operators of farms and ranches on which measures are applied. This will be done under agreement with the High Point Soil and Water Conservation District. Representatives of the District will periodically survey the status of land treatment measures and encourage land users to apply necessary maintenance.

Upon acceptance of the two floodwater retarding structures and the floodwater diversion, the Culberson County Commissioners Court will be totally responsible for all maintenance. The court will perform promptly, without cost to the Service, all maintenance of the structural measures as determined to be needed by either the sponsors or the Service.

The Soil Conservation Service, through the High Point Soil and Water Conservation District, will participate in operation and maintenance only to the extent of furnishing technical assistance to aid in inspections and technical guidance and information necessary for the operation and maintenance program.

1/ United States Department of Agriculture, Soil Conservation Service, 1971, National List of Scientific Plant Names.

The estimated annual operation and maintenance cost for floodwater retarding structures and the floodwater diversion is \$3,000. Monies for operation and maintenance will be supplied from the general fund of Culberson County. This fund is supported by revenue from existing taxes. Each year the Culberson County Commissioners Court will budget sufficient funds for operation and maintenance.

The Culberson County Commissionssioners Court will operate and maintain the structural measures in accordance with a specific operation and maintenance agreement for each floodwater retarding structure and the floodwater diversion, in accordance with provisions of the Texas Watersheds Operations and Maintenance Handbook. The operation and maintenance agreement for each structure will be prepared and executed prior to the signing of a project agreement for the construction of any of the structures. The agreement will set forth the inspections to be made and the maintenance to be performed to prevent soil erosion and water pollution. It will also include specific provisions for retention and disposal of property acquired or improved with Public Law-566 financial assistance.

Floodwater retarding structures and the floodwater diversion will be inspected at least annually and after each heavy rain by representatives of the Culberson County Commissioners Court and the High Point Soil and Water Conservation District. A Soil Conservation Service representative will participate in these inspections for a period of at least three years following construction. The Soil Conservation Service will participate in inspections as often as it elects to do so after the third year. The location and type of needed maintenance will be determined as a result of the inspections. Items of inspection will include, but will not be limited to, conditions of principal spillways and their appurtenances, emergency spillways, earth fills, degradation, aggradation, slope erosion, obstruction of flow caused by debris and/or sediment deposited in the diversion channel, invasion of brush and woody plants, and the condition of major drains into the floodwater diversion. The need for frequent removal of sediment deposits in the floodwater diversion channel at the entrance of major natural drains is anticipated.

A written report will be made of each inspection. A copy of each report will be provided by the Culberson County Commissioners Court to the designated Service representative within ten days of the date on which the inspection was made.

Provisions will be made for unrestricted access by representatives of sponsoring local organizations and the Soil Conservation Service to inspect all structural measures and their appurtenances at any time and for sponsoring local organizations to operate and maintain them. Easements insuring this unrestricted ingress and egress will be furnished by the Culberson County Commissioners Court.

Sponsors will control the handling, storage, and application of herbicides and pesticides that may be necessary for operation of the structural works of improvement. Approved reagents and compounds will be used. Their application will be compatible with current laws regulating their use. In addition to sound and prudent judgement, ordinances and standards concerned with the disposal or storage of unused chemicals, empty containers, contaminated equipment, etc., will be observed and applied.

The Culberson County Commissioners Court will maintain a record of all maintenance inspections made and maintenance performed and have it available for inspection by Soil Conservation Service personnel.

The necessary maintenance work will be accomplished either by contract, force account, or by sponsoring local organizations using their own equipment.

The estimated costs for installation of the project are presented in the following tabulation:

| Installation Cost Item | Estimated Cost (Dollars) 1/ | | |
|----------------------------|-----------------------------|---------|-----------|
| | Public Law 566 | Other | Total |
| <u>Land Treatment</u> | | | |
| Installation | - | 171,300 | 171,300 |
| Technical Assistance | - | 19,000 | 19,000 |
| Subtotal | - | 190,300 | 190,300 |
| <u>Structural Measures</u> | | | |
| Construction | 885,540 | - | 885,540 |
| Engineering Services | 44,280 | - | 44,280 |
| Project Administration | 128,520 | 2,000 | 130,520 |
| Land Rights | - | 42,450 | 42,450 |
| Subtotal | 1,058,340 | 44,450 | 1,102,790 |
| Total Project | 1,058,340 | 234,750 | 1,293,090 |

1/ Price Base: 1975

The estimated average annual cost for operation and maintenance of the two floodwater retarding structures and 55,000 feet of floodwater diversion is \$3,000.

ENVIRONMENTAL SETTING

Physical Data

Three-Mile and Sulfur Draw Watershed comprises an area of 95,360 acres (149 square miles) in Culberson and Hudspeth Counties, Texas. The

watershed is located within the Trans-Pecos Region of Texas about 120 miles southeast of El Paso, Texas; 190 miles northwest of Big Bend National Park; and 110 miles south of Carlsbad, New Mexico. The city of Van Horn is on the southern boundary of the watershed.

Climatic conditions in the watershed are arid. The average annual precipitation is about 10 inches. Thirty years of records indicate that over 60 percent of this average will fall during the months of July through October. The area is subject to high intensity rains of short duration with long interim periods of very little or no measurable rainfall. Winter and early spring are usually very dry. The net annual evaporation rate for the area is about 75 inches. Temperatures range from a mean maximum in July of 95 degrees Fahrenheit to a mean minimum of 30 degrees in January. The normal growing season is from about April 1 to November 11, or 224 days. 1/

Watershed elevations range from 6,519 feet above mean sea level on the northwestern divide in the Sierra Diablo Foothills to approximately 3,690 feet along Wild Horse Draw. The western one-half and the extreme north central part of the watershed is dominated by areas of steep, rugged topography consisting mainly of the Beach Mountains and portions of the Carrizo and Baylor Mountains and the Sierra Diablo Foothills (Appendix B). These mountains are fault-block mountains that display flat tops bounded by abrupt or very steeply sloping, prominent scarps characteristic of mesas. Slopes at the base of the mountains are generally less than those at higher elevations. The eastern portion of the watershed is within a large, regional, north-south trending, intermontane, enclosed basin which has a rather uniform width of about 20 miles and a length in excess of 100 miles. The northern portion of the basin extends into southern New Mexico. The eastern periphery of the watershed is a nearly level, topographically featureless area. Proceeding from east to west, the slope of the land becomes progressively greater until there is an abrupt change at the base of the mountains.

The two principal water courses in the watershed, Three-Mile Draw and Sulfur Draw, originate in the southern portion of the Sierra Diablo Foothills (Appendix B). Three-Mile Draw flows in a southeasterly direction between the southern end of the Beach Mountains and the eastern tip of the Carrizo Mountains, then turns toward the northeast and flows on to a broad alluvial plain in the eastern and northeastern part of the watershed known as the Wild Horse farming area. The portion of Wild Horse farming area within the watershed is intensively cultivated and irrigated and lies on the west side of Wild Horse Draw which flows northward into a series of intermittent salt lakes known as Salt Basin. The southern portion of Salt Basin is about 40 miles north of Van Horn.

1/ "Climatological Data, Texas Annual Summary," U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Data Service.

From its origin, Sulfur Draw flows eastward between the northern end of the Beach Mountains and the southern extremity of the Baylor Mountains and then into the Wild Horse farming area. The watershed lies within the Rio Grande Water Resource Area.

All water courses in the watershed are ephemeral, flowing only in response to surface runoff. Stream channels in the mountainous portions of the watershed are well defined and unmodified by man. Deposition of sediment where streams flow out of the mountainous areas has formed large alluvial fans. The streams frequently change course as additional sediment is deposited on the fans. As streamflow approaches the outer edge of the alluvial fans, where channels are poorly defined, the water spreads out into an overland type flow. Floodwaters from Three-Mile Draw, Sulfur Draw, and several unnamed draws merge in or above the Wild Horse farming area and follow an undefined course until they reach Wild Horse Draw.

There is no known data available concerning quality of watershed runoff and streamflow. However, "Texas Water Quality Standards," October 1973, published by the Texas Water Quality Board, lists criteria that can be utilized to determine water quality in a general sense. The general criteria set forth are applicable to all surface water in Texas at all times and specifically apply with respect to substances attributed to waste discharges or the activities of man as opposed to natural phenomena. The criteria, which is extracted from the above mentioned publication, are as follows:

- "1. Taste and odor producing substances shall be limited to concentrations in the waters of the State that will not interfere with the production of potable water by reasonable water treatment methods, or impart unpalatable flavor to food fish, including shellfish, or result in offensive odors arising from the waters, or otherwise interfere with the reasonable use of the waters.
- "2. Essentially free of floating debris and settleable suspended solids conducive to the production of putrescible sludge deposits or sediment layers which would adversely affect benthic biota or other lawful uses.
- "3. Essentially free of settleable suspended solids conducive to changes in the flow characteristics of stream channels, to the untimely filling of reservoirs and lakes, and which might result in unnecessary dredging costs.
- "4. The surface waters in the State shall be maintained in an aesthetically attractive condition.
- "5. There shall be no substantial change in turbidity from ambient conditions due to waste discharges.

- "6. There shall be no foaming or frothing of a persistent nature.
- "7. There shall be no discharge of radioactive materials in excess of that amount regulated by the Texas Radiation Control Act, Article 4590(f), Revised Civil Statutes, State of Texas and Texas Regulation for Control of Radiation. Radioactivity levels in the surface waters of Texas, including the radioactivity levels in both suspended and dissolved solids for the years 1958 through 1960, were measured and evaluated by the Environmental Sanitation Services Section of the Texas State Department of Health in a report prepared for and at the direction of the Health Department by the Sanitary Engineering Research Laboratory at the University of Texas. The document is entitled, 'Report on Radioactivity--Levels in Surface Waters--1958-1960' pursuant to contract No. 4413-407 and is dated June 30, 1960. This document comprises an authoritative report on background radioactivity levels in the surface waters in the State and quite importantly sets out the locations where natural radioactive deposits have influenced surface water radioactivity. The impact of radioactive discharges that may be made into the surface waters of Texas will be evaluated and judgments made on the basis of the information in the report which was at the time made, and may still be the only comprehensive report of its kind in the nation.

Radioactivity in fresh waters associated with the dissolved minerals (measurements made on filtered samples) shall not exceed those enumerated in U.S. Public Health Service, Drinking Water Standards, Revised 1962, or latest revision, unless such conditions are of natural origin.

- "8. The surface waters of the State shall be maintained so that they will not be toxic to man, fish and wildlife, and other terrestrial and aquatic life.

With specific reference to public drinking water supplies, toxic materials not removable by ordinary water treatment techniques shall not exceed those enumerated in U.S. Public Health Service, Drinking Water Standards, 1962 edition, or later revision.

For a general guide, with respect to fish toxicity, receiving waters outside mixing zones should not have a concentration of nonpersistent toxic materials exceeding 1/10 of the 96-hour TLm., where the bioassay is made using fish indigenous to the receiving waters. Similarly, for persistent toxicants, the concentrations should not exceed 1/20 of the 96-hour TLm.

In general, for evaluations of toxicity, bioassay techniques will be selected as suited to the purpose at hand. However,

bioassays will be conducted under water quality conditions (temperature, hardness, pH, salinity, dissolved oxygen, etc.) which approximate those of the receiving stream as closely as practical.

- "9. As detailed studies are completed, limiting nutrients identified, and the feasibility of controlling excessive standing crops of phytoplankton or other aquatic growths by nutrient limitations is determined, it is anticipated that nutrient standards will be established on the surface waters of the State. Such decisions will be made on a case-by-case basis by the Board after proper hearing and public participation. The establishment of a schedule for decisions as to the need for nutrient standards for specific waters and what standards should be adopted is not feasible at this time.
- "10. The surface waters of the State shall be maintained so that no oil, grease, or related residue will produce a visible film of oil or globules of grease on the surface, or coat the banks and bottoms of the watercourse."

Visual inspection of the watershed reveals there are presently no sources of pollution from activities of man that would cause failure of watershed runoff to meet those criteria.

Diversions or levees have been constructed in an attempt to control floodwater originating in the watershed. In 1929, the Texas and Pacific Railroad Company installed a floodwater diversion above Van Horn in an attempt to provide flood protection for railroad facilities and the city of Van Horn. The county and land users have installed diversions to divert floodwater away from the county air field and irrigated cropland in the Wild Horse farming area. These diversions or levees are adequate for small, frequently occurring floods, but do not effectively control large floods.

There are no existing or proposed water resource development projects of any other agencies within the watershed. Similarly, there are no known existing or proposed downstream water resource development projects of other agencies.

The Trans-Pecos Region of Texas has a very complicated geologic history of uplifting and subsidence, faulting and folding, volcanic activity, and igneous intrusion. These have all had a profound effect on the geology of the watershed as it is today. The mountains in the watershed are fault-block mountains. The Beach Mountains and portions of the Carrizo and Baylor Mountains are composed primarily of Precambrian and Cambrian metamorphosed sandstone and conglomerate; and Ordovician limestone, dolomite, and sandstone. Also present, but less extensive in area, are Permian limestone, dolomite, shale, marl, and conglomerate; rock of volcanic origin which is probably Tertiary in age; Quaternary

terrace deposits of gravel; and Recent colluvial, alluvial, and aeolian deposits.

The Precambrian Allamore Formation is the oldest geologic unit in the watershed. It consists of thin to thick bedded cherty limestone, phyllite, and volcanic rock. Shallow intrusions of igneous origin can be found in some areas of the formation. The exact thickness of the formation has not been determined, but it is believed to be several thousand feet thick.

The Hazel Formation, also Precambrian in age, overlies the Allamore Formation. The base of the Hazel Formation is a conglomerate composed of poorly sorted fragments of Allamore limestone, indicating a disconformity between the two formations. This basal conglomerate is overlain by massive, indistinctly bedded, fine-grained, well indurated, brick-red sandstone. The entire formation is approximately 5,000 feet thick.

The Hazel Formation and the Allamore Formation are slightly metamorphosed which is partially due to the complex history of thrust faulting and folding that took place after Hazel sediment was deposited and before the overlying Precambrian-early Cambrian Van Horn Sandstone was laid down.

The Van Horn Sandstone Formation lies unconformably on the Hazel Formation. This formation is comprised of continental, post-orogenic sediment that is medium to coarse-grained, crossbedded, thickbedded, and yellow-brown to maroon sandstone and arkose in the upper part. The lower part is characterized by a conglomerate of well rounded pebble to boulder-size fragments in an arkosic sand matrix. The Van Horn Sandstone is faulted and tilted, but not folded and metamorphosed as the underlying Hazel and Allamore Formations.

Ordovician strata unconformably overlie the Van Horn Sandstone and older rocks in the Beach Mountains. These strata, in ascending order, are the Bliss Sandstone Formation, El Paso Formation (basal calcareous sandstone with overlying limestone) and the Montoya Dolomite Formation. Rocks of the Silurian, Devonian, Mississippian, and the Pennsylvanian systems are not found in the watershed. The Hueco Limestone Formation, which belongs to the Permian System, is present in the watershed as cliff-forming cap rock on the mountains. This formation consists of a basal marl, red shale, conglomerate member overlain by a thin to thick-bedded limestone.

The eastern one-half of the watershed lies within a large, north-south trending graben (the intermontane enclosed basin previously referred to). Quaternary bolson deposits of lenticular gravel, sand, silt, and clay have accumulated in this area to a thickness of more than 800 feet. The edge of the area at the foot of the Beach Mountains is a moderately sloping outwash area of interfingering and overlapping alluvial fans.

Terrace gravel of the Quaternary Leona Formation, and Recent colluvial, alluvial, and aeolian deposits are also present in the watershed.

In addition to the previously mentioned Precambrian faulting, normal faulting of Tertiary or later age has occurred in all exposed strata. 1/

The only account of an earthquake in the area during recorded history was on August 16, 1931. Moderate after shocks were recorded on August 18 and November 3 of the same year. The epicenter of the tremor was near Valentine, Texas, approximately 40 miles south of the watershed. The intensity of the tremor at Van Horn, Texas, according to the "Modified Mercalli Intensity Scale of 1931" was VI-VII. 2/ From an earthquake of this magnitude, persons in automobiles can detect movement. Damage to well designed and constructed buildings is negligible, however, poorly built structures can be expected to sustain some damage. Presently, it is impossible to predict the magnitude and time earthquakes will occur in the region. If there is another tremor, it could occur tomorrow, or thousands, or possibly millions of years in the future.

Soils in the watershed are included in the Southern Desertic Basins, Plains, and Mountains Land Resource Area. Due to the low annual precipitation, all areas used as cropland must be irrigated to produce cotton, grain sorghum, onions or any other crop grown in the watershed. Pastureland and hayland also require irrigation. Rangeland is not irrigated. In the mountainous western and extreme northern portions of the watershed, soils are on very steep or undulating slopes. Much of the very steeply sloping area is bare rock. The Lozier series is representative of the soils occurring on the steeply sloping areas. This series is shallow, moderately permeable, stony, and very gravelly loam. Lozier soils are not suited for cropland and are used exclusively as rangeland. Typical soils on the undulating slopes are shallow, moderately permeable, stony, and very gravelly loams of the Delnorte and Upton series. Delnorte and Upton soils are not suitable for growing crops and are used as rangeland.

Soils on the alluvial fans are moderately to rapidly permeable, calcareous, gravelly loam and fine sandy loam of the Augustin and Canutio series. Augustin soils with slopes as much as three percent are suitable for cropland. However, none of these soils in the watershed with slopes greater than one percent are presently being used as cropland. Canutio soils are not suitable for cropland and are used as rangeland.

1/ In addition to field investigations by SCS geologists, the Geologic Atlas of Texas, Van Horn-El Paso Sheet, Bureau of Economic Geology, The University of Texas at Austin, was used to describe the geology of the watershed.

2/ United States Earthquakes Bulletin, 1931 Coast and Geodetic Survey, United States Department of Commerce.

Toward the eastern periphery of the watershed (Wild Horse farming area) soils are moderately permeable Reakor loam and clay loam, moderate to rapidly permeable Pajarito fine sandy loam, and slowly permeable Verhalen clay. These are all deep soils with the potential of producing abundant crops with proper application of the ground water presently being used for irrigation.

Land use within the watershed is shown in the following tabulation:

| <u>Land Use</u> | <u>Acres</u> | <u>Percent</u> |
|----------------------|--------------|----------------|
| Cropland (Irrigated) | 8,300 | 8.7 |
| Pasture and Hayland | 100 | 0.1 |
| Rangeland * | 84,580 | 88.7 |
| Miscellaneous ** | <u>2,380</u> | <u>2.5</u> |
| | 95,360 | 100.0 |

* Includes 8,800 acres used primarily as wildlife-recreation land.

** Includes roads, highways, railroad rights-of-way, urban area, farmsteads, ranch headquarters, airport, etc.

Water supplies for irrigation, the city of Van Horn, rural domestic uses, and livestock are obtained from wells. Aquifers in the watershed area are lenticular sand and gravel. Water levels in these strata average about 400 feet below the ground surface. The top of the water table dips to the north at approximately 23 feet per mile. However, the slope of the land to the north is generally greater than the water table and water not withdrawn from wells eventually comes to the surface in central Culberson County where it evaporates.

Ground water recharge is limited to small ephemeral streams emerging from the mountainous area and flowing into porous alluvial material. This recharge must occur during times of heaviest rainfall (July, August, and September). However, ground water quantity is considered to be adequate to meet the anticipated future needs of Van Horn and for irrigation of crops. The static water level in 1951 was at a depth of about 400 feet. Due to a heavy demand and pumping, the water level declined from five to fifteen feet during the period of 1955 to 1965. The maximum decline occurred toward the center of the basin or near the eastern edge of the watershed. The water level is now relatively stable.

The water is not excessively mineralized, however, free sodium content is considered to be high, ranging from approximately 45 to 75 percent. With proper management, most of the soils in the Wild Horse farming area are suitable for irrigation use of high sodium content water because of



Topography, vegetation, and soils in drainage area of Sulfur Draw in northwestern portion of watershed.



Topography, vegetation, and soils in drainage area of Three-Mile Draw in western portion of watershed.



View to the north from existing diversion above Van Horn.



View to the northwest from the vicinity of Van Horn.

TOPOGRAPHY, VEGETATION, AND SOILS IN THREE-MILE AND SULFUR DRAW WATERSHED.

their moderate to rapid permeabilities and slight gypsum content. The pH is slightly alkaline, averaging 7.5. 1/

According to the Bureau of Mines, mineral resources known to be in the vicinity of the watershed (Culberson and Hudspeth Counties) are petroleum, natural gas, gypsum, sulfur, nitrate, asbestos, talc, beryllium, copper, silver, stone, sand, and gravel. However, commercial quantities and development of mineral resources in the watershed are limited. The Hazel Mine, opened in 1856, was operated intermittently until 1947. Available records on total production are not complete and only estimates can be made. Estimates indicate that at least 110,000 tons of ore were produced which yielded in excess of 1,500,000 pounds of copper and 4,000,000 ounces of silver. 2/ Presently the machinery and improvements at the mine are in a state of disrepair and a major portion of the mine shaft is flooded. Additional operations are not anticipated unless much more efficient methods of recovering the ore are devised or the recent increases in copper and silver prices should continue in a sustained upward trend. Sand, gravel, and talc are presently being quarried and mined in the watershed. The production of these materials is limited in quantity and has a minimal influence on the watershed economy.

Economic Resources

The agricultural economy of the watershed is dependent on the production and sale of cash crops and livestock. About 70 percent of the total agricultural income in the watershed is derived from the sale of cash crops and 30 percent from the sale of livestock.

Major crops grown in the flood prone area and average yields per acre are: cotton, 800 pounds; grain sorghums, 5,000 pounds; oats, 40 bushels, and 6 animal unit months of grazing; and onions, 600 fifty-pound sacks. Sudan hay yields about five tons per acre. The average carrying capacity of rangeland is about six animal units per section.

The availability of irrigation water, capability of land, and market prices being paid for crops are major factors determining use of agricultural land in the watershed. Agricultural land not devoted to crop production is used primarily for the grazing of cattle and for wildlife.

There are approximately 25 farms and ranch units wholly or partially within the watershed. Ranch units average about 6,900 acres in size

1/ Longenecker, D.E. and Lyerly, P.J., 1959. Some Relations Among Irrigation Water Quality, Soil Characteristics and Management Practices in the Trans-Pecos Area, Texas Agricultural Experiment Station MP-373.

2/ King, P.B., and Flawn, P.T. 1953. Geology and Mineral Deposits of Pre-Cambrian Rocks of the Van Horn Area, Texas: p. 154.

while farms average about 740 acres. There has been a gradual increase in size and a decrease in the number of farms. About 42 percent of the ranches and 30 percent of the farms are owner-operated.

The estimated current market price of rangeland varies from \$35 to \$45 per acre while cropland varies from \$350 to \$400 per acre. The variation in land prices is dependent on several factors including location, accessibility, soil capability, and the availability of irrigation water. All the farms and ranches in the watershed gross more than \$2,500 annually from agricultural sales. Approximately 30 percent of the farm and ranch operators worked off the farm 100 days or more in 1970.

It is estimated that about 10 percent of the agricultural land in the area is in operating units using one and one-half man-years or more of hired labor.

The "Labor Force Estimates for Texas Counties - April 1974," the latest statistics which are available, shows a labor force of 2,470 for the two counties within which the watershed is located. Approximately 2.0 percent, or 50 workers are unemployed. This is below the state and national rates of unemployment. Approximately 31.6 percent, 780 workers, are employed in the agricultural sector. The nonagricultural sector employs 1,640 workers; 60 workers in the manufacturing sector, and 1,560 in the nonmanufacturing sector.

The combined population for Culberson and Hudspeth Counties are project to decline from a total of 5,821 in the year 1970 to 4,800 in 1990. ^{1/} This decrease in population was predicated upon a declining birth rate during the 1970-90 period.

The city of Van Horn, located on the southern boundary of the watershed, has a population of 2,240 (1970 census). It is the county seat of Culberson County and the commercial center for the surrounding farm and ranch area, providing marketing and supply services which are important in the local community. Situated at the junction of Interstate Highway 10 (U.S. Highway 80), U.S. Highway 90, and State Highway 54, in a sparsely populated region, Van Horn provides facilities for many tourists and travelers.

The watershed is served adequately by highways listed above and Farm Roads 2185 and 2809. There are also several county roads which provide access to the watershed. The Texas and Pacific Railroad has loading facilities in Van Horn.

^{1/} Preliminary Population Projections, Series B, for Texas Counties: 1975-1990, Population Research Center, The University of Texas at Austin, Austin, Texas.

Plant and Animal Resources (Flora and Fauna)

The original vegetative community was primarily a desert shrub grassland. Woody plants consisted of a thin stand of desert shrubs such as creosotebush, tarbush (Flourensia cernua), allthorn (Koeberlinia spinosa), ocotillo (Fouquieria splendens), and lecheguilla. Desert willow (Chilopsis linearis), mesquite (Prosopis juliflora), and other woody species occurred along the stream courses. Grasses on the more arid sites consisted of a rather open stand of desert grasses such as black grama (Bouteloua eriopoda), rough tridens (Tridens elongatus), bush muhly (Muhlenbergia porteri), mesa dropseed (Sporobolus flexuosus), hairy grama (Bouteloua hirsuta), chino grama (Bouteloua breviseta), and threeawns (Aristida spp.). On more favorable sites a thin stand of sideoats grama (Bouteloua curtipendula), cane bluestem (Andropogon barbinodis), and green sprangletop (Leptochloa dubia) occurred. Tobosa (Hilaria mutica) and vine-mesquite (Panicum obtusum) occurred on the fine textured soils near Wild Horse Draw. Perennial forbs and woody species comprised less than 10 percent of the total composition.

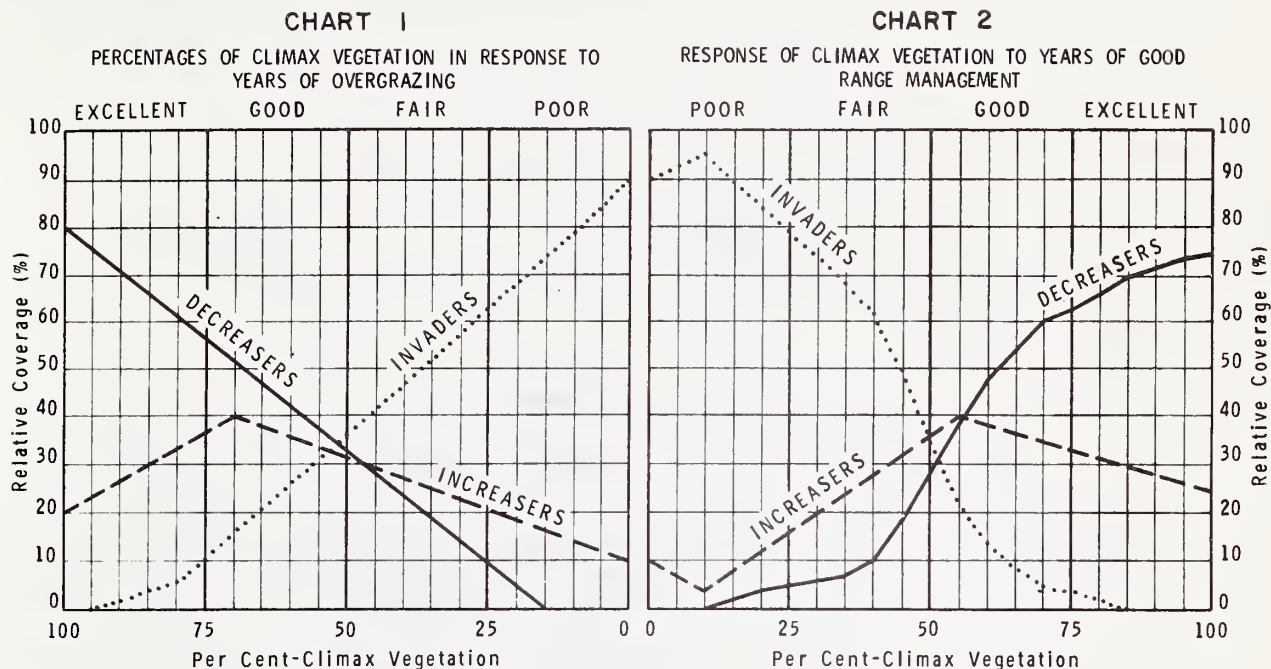
The present rangeland vegetation within the watershed is significantly different from the original or climax vegetation. Grazing by domestic livestock, which began about 1895, has altered the composition by reducing the more palatable forb and grass species. Early stock raisers in the area had little concept of the grazing capacity of rangeland and overuse of forage species was widespread until relatively recent times. As climax grasses and forbs were eliminated by overuse, they were replaced by plants capable of surviving overuse or by plants which were not readily grazed by livestock. Plants which increased or invaded with overuse include threeawns, sand dropseed (Sporobolus cryptandrus), hairy tridens (Tridens pilosus), creosotebush, fluffgrass (Erioneuron pulchellum), mesquite, lecheguilla, and annual species of grasses and forbs.

As a result of past overuse, large areas of rangeland have not regained their former level of productivity and remain generally in poor to fair condition. Improved range management and reduced stocking rates are accepted as necessary elements of a successful ranching operation by the majority of present land users. Rangeland response to overgrazing and proper range management are illustrated by charts 1 and 2 on the following page. Chart 3 indicates the grazing capacity of various range sites in various condition classes. Chart 4 illustrates the general location of range sites and approximate condition classes.

Hydrologic cover conditions correspond directly with the quantity of vegetative cover and range from poor to good within the watershed.

The fish and wildlife habitat, species, and populations in the watershed are described in the following paragraphs extracted from the Fish and Wildlife Service report dated December 22, 1970.

RANGE CONDITION



DECREASERS - Plants present in the potential plant community which decrease with overgrazing.

INCREASERS - Plants present in the potential plant community which initially increase with overgrazing but eventually decrease if overgrazing is prolonged.

INVADERS - Plants not present in the potential plant community but which encroach and occupy the area vacated by the decreaseers and increasers under prolonged over-use.

CHART NO. 1

This chart illustrates the reaction of rangeland vegetation to prolonged periods of overgrazing. The more desirable plants decrease. Others present increase for a short time and then decrease as the grazing load shifts to them. Undesirable plants present only in trace amounts invade and occupy the area vacated by the original plants.

CHART NO. 2

POOR CONDITION

The invader plants increase in percent ground cover during the first few years when grazing pressure is lightened or wholly removed. This increase continues as long as there is bare ground for this type of plant to occupy. The increaser plants are low in vigor and are slow to start spreading. Both increaser plants and the trace of decreaseer plants begin to occupy more area as the cover and litter accumulates and plant vigor increases. At this stage, the less competitive invaders, such as annuals, begin to diminish and give way to plants of higher order.

FAIR CONDITION

The increaser plants continue to spread and compete more heavily for the water, nutrients, and light. Decreaser plants gain vigor, produce seed, and begin to spread more rapidly by establishing new plants by vegetative means. The invader species start to decline rapidly as competition becomes more and more severe.

GOOD CONDITION

Decreaser plants increase more rapidly. Invader species continue to be eliminated as competition with plants of higher ecological status becomes more severe. Increasers spread for a short time until competition with plants of higher rank force them to diminish gradually.

EXCELLENT CONDITION

Invader plants are soon reduced to only a trace of the composition. Adjustment between the climax plants continues to take place as the decreaseers slow down their spread but continue a gradual climb in percent coverage. The increaser species are gradually reduced to their proper percentage in the highly competitive community. Decreasers may not attain as high a percentage of the composition as they occupied before deterioration, due to some species having been eliminated completely.

Three-Mile and Sulfur Draw Watershed, Texas

CHART 3

Grazing capacity ^{1/} of rangeland by range site and condition class.

| Range Site | Condition Class | | | |
|----------------------------------|-----------------|--------|--------|---------|
| | :Excellent | : Good | : Fair | : Poor |
| Clay Flat Site | 26-43 | 32-53 | 46-91 | 64-107 |
| Deep Upland Site | 28-43 | 32-53 | 53-107 | 80-213 |
| Gravelly Site | 43-53 | 49-80 | 64-128 | 107-320 |
| Limestone Hill and Mountain Site | 32-46 | 40-58 | 53-120 | 80-213 |
| Sandy Loam Site | 28-40 | 40-53 | 49-80 | 80-213 |

^{1/} Expressed in acres required to furnish forage for one animal unit on a year-long basis.

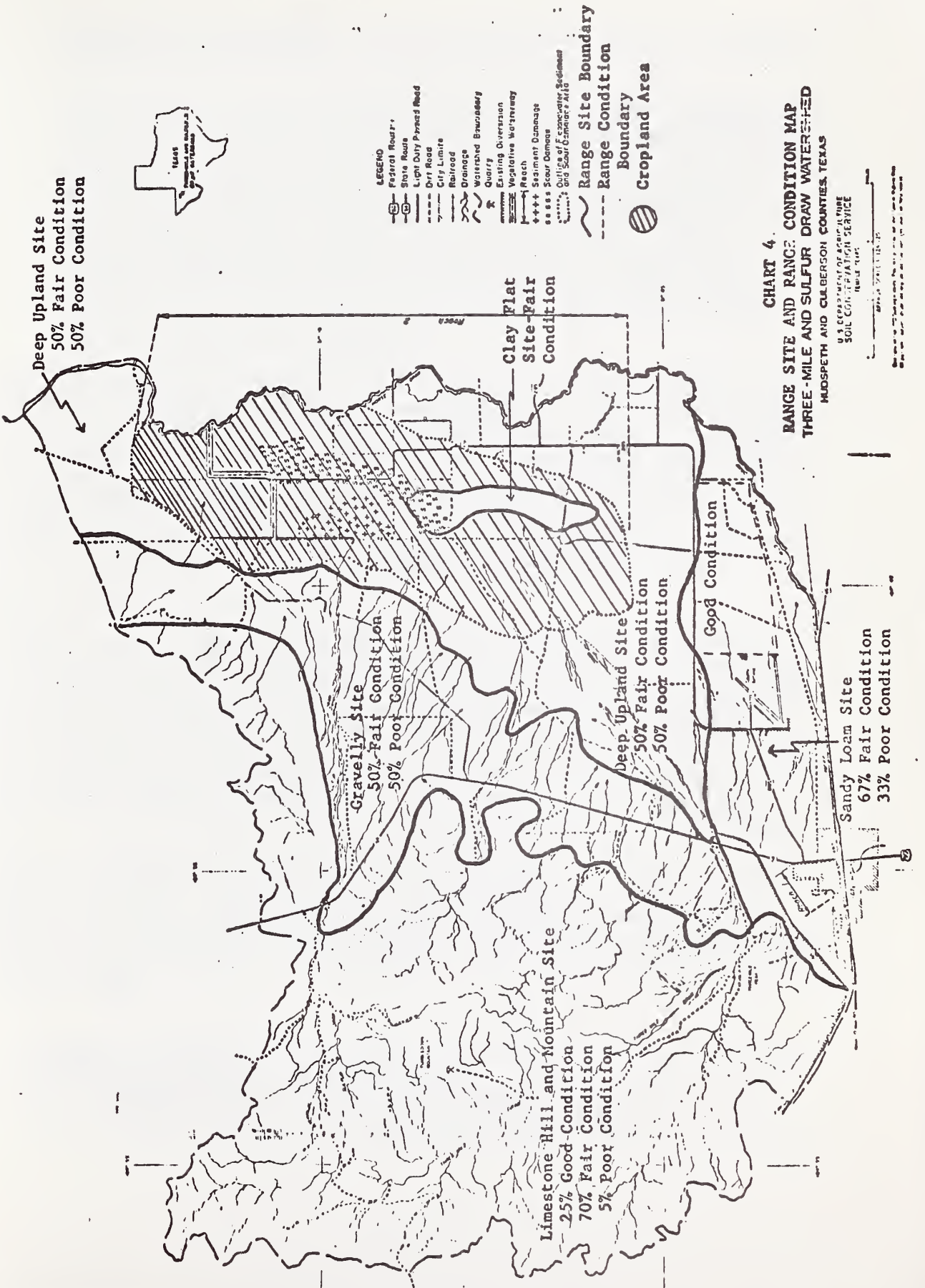


CHART 4.
RANGE SITE AND RANGE CONDITION MAP
THREE-MILE AND SULFUR DRAW WATERSHEDS
MIDSPETH AND CULBERSON COUNTIES, TEXAS

U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

"There is no fish habitat in the project area and none is expected to develop in the future without the project.

The entire watershed is located within the Trans-Pecos Game Region of the state. Principal wildlife species include mule deer, scaled quail, mourning dove, jackrabbit, cottontail, gray fox, and coyote. Wildlife of lesser importance because of their relatively low populations are white-winged dove, kit fox, bobcat, mountain lion, raccoon, skunk, ring-tailed cat, and badger. Bighorn sheep once ranged the higher elevations of this area, but the increased human inhabitation in recent years has pushed the species to more remote areas of the region and none have been reported in the area since the mid 1950's. Waterfowl are not known to frequent the watershed."

Mule deer numbers are highest in the upper part of the watershed in the mountains and foothill areas, and populations are estimated to be about one deer to 64 acres. The mule deer population is very low or absent in the lower portion of the watershed and in the Wild Horse farming area. Scaled quail populations are estimated to be about one bird per ten acres in the watershed. The greatest concentration of scaled quail is along the draws. About 500 white-winged doves and 1,500 to 2,000 mourning doves nest in the watershed. The coyote population is estimated to be one per section. Furbearer populations are low. 1/

The Texas Parks and Wildlife Department has recently released six bighorn sheep in the Sierra Diablo Mountains and plan to release an additional five or six animals in the area in 1974. These animals are not cited by the U.S. Fish and Wildlife Service 2/ as endangered fauna, but do receive protection in Texas under the Texas Parks and Wildlife Code (Chapter 68, Acts of the 64th Legislature, Regular Session, 1975), which related to nongame and endangered species. A list which includes the bighorn sheep has been filed with the Texas Secretary of State. The list cites those animals threatened with extinction in Texas. This species may occasionally range into the upper portion of the watershed.

The only endangered species as recognized by the U.S. Fish and Wildlife Service that may occasionally visit the watershed is the American peregrine falcon. This bird also receives protection under the Texas Parks and Wildlife Code. Other animals of questionable status and whose natural range includes the watershed are the mountain lion, kit fox, and golden eagle.

1/ Personal communication with John Shane, Biologist, Texas Parks and Wildlife Department, Van Horn, Texas.

2/ U.S. Department of the Interior, U.S. Fish and Wildlife Service. 1974. United States List of Endangered Fauna. 22pp.

Recreational Resources

Approximately 8,800 acres of rangeland in the watershed are used primarily as wildlife-recreation land. This area is used principally for the production and hunting of mule deer and scaled quail. Also, 72,000 acres of rangeland has a secondary use as wildlife-recreation land. About 35,000 acres of this area is leased for private hunting, and the remaining 37,000 acres are used for noncommercial recreation by the owners and operators and their guests. The annual gross income from leasing varies from about 10 cents to 15 cents per acre.

According to the following excerpt from the Fish and Wildlife Service reports:

"Mule deer are the most sought-after game species of the project area. Ranchers are reluctant to allow any public access, but some properties are leased for deer hunting. Scaled quail and mourning dove are second in popularity. They are the primary game species hunted by landowners and their close friends. Jackrabbits and cottontails are taken in relatively low numbers and are hunted only incidental to quail and doves. Gray foxes, coyotes, and bobcats are moderate in number, but do not receive any significant amount of hunting. Other wildlife species in the watershed have very low population levels and are not hunted. There is no known trapping of fur animals within the watershed."

Archeological and Historical Values

There are no historic or archeological sites within the watershed that are listed in or in the process of nomination to the National Register of Historic Places. However, significant archeological resources of scientific interest have been located in the watershed.

Dr. S. Alan Skinner and Mr. C. Britt Bousman, archeologists with the Archaeology Research Program, Department of Anthropology, Southern Methodist University, conducted a reconnaissance survey on portions of the watershed to locate historical and archeological resources that could be effected by project structural measures. The reconnaissance survey located 11 archeology sites and nothing of historical significance. The 11 prehistoric sites, which appear to have been occupied during the period 1000 B.C. to A.D. 1500, consist of eight open sites and three rock shelters. Open campsites occur on alluvium which will be crossed by the planned floodwater diversion and on ridges adjacent to the area required for Floodwater Retarding Structure No. 1. All the shelters are in the vicinity of planned Floodwater Retarding Structure No. 2. All sites are small in area and have a limited artifact assemblage. Maintenance activities attributed to the artifacts include food processing, chipped stone tool manufacture, hunting, cooking, hide preparation, and stone quarrying. Food processing and tool manufacturing appear to dominate the assemblages.

When all potential structural measures were located in detail the Archaeology Research Program, Southern Methodist University, performed additional studies and evaluations of the potentially affected sites. All 11 of the sites were reevaluated by Southern Methodist University to determine if they would be affected and to ascertain the eligibility of any site, or sites for nomination to the National Register of Historic Places. As a result of this reevaluation which included comprehensive testing of three sites, none of the sites were considered worthy of nomination. On the basis of the reevaluation and testing, it was concluded that the installation of the planned project on the watershed will not affect any archeological sites eligible for nomination to the National Register of Historic Places. The State Historic Preservation officer reviewed the entire case file relative to all cultural resources to be affected by the project and concurred that none of the 11 archeological sites located are eligible for nomination to the National Register of Historic Places.

Soil, Water, and Plant Management Status

The watershed is composed primarily of rangeland which is grazed by livestock and wildlife. Rangeland exceeds 88 percent of the total land area within the watershed. Little change in land use is expected to occur in the future. Land used primarily for wildlife production is expected to increase as demand for hunting becomes greater.

There are 25 farm and ranch units located wholly or partially within the watershed. Twenty-three District cooperators have developed resource conservation plans in cooperation with the High Point Soil and Water Conservation District. These plans cover 90,597 acres, or 95 percent of the watershed.

The High Point Soil and Water Conservation District is a local subdivision of state government with elected directors. The district is dedicated to the conservation of land, water, wildlife, and related resources for the benefit of all.

Conservation plans developed by land users in consultation with resource personnel assisting the soil and water conservation district are the basis for most land treatment measures. Conservation plans are documents which contain material relative to the use and treatment of soil, water, plant, wildlife, and related resources of an entire individual land unit. Conservation plans contain soil, water, plant, and other needed inventories; data on critical conservation problems; and a record of decisions which the land user has made to reach his conservation objectives. The length of time required to fully implement a plan is contingent upon many factors, including: available labor, capital, materials, and time.

Conservation land treatment has been a primary objective of the High Point Soil and Water Conservation District since its organization in 1948. The District actively assists land users in the watershed and

surrounding area in applying and maintaining needed conservation measures on a majority of farms and ranches.

About 82,000 acres within the watershed are considered to be adequately protected from erosion. Rangeland is considered to be adequately protected when proper grazing use is applied and maintained. Rangeland which has 2,000 pounds or more of living or dead cover maintained on the land through critical erosion periods except during droughts, is also considered to be adequately protected. Critical area treatment must be applied to areas where needed before rangeland is considered adequately protected. Irrigated cropland which has slopes of less than one percent is considered to be adequately protected. Land treatment measures have been applied to date at an estimated expenditure of \$78,860 by land users.

A soil survey is the classification, mapping, correlation, and interpretation of various types of soils in an area. Soils are classified considering their physical, chemical, and mineralogical characteristics. The classified soils are located and outlined on a map or aerial photograph of the area being surveyed, and correlated to determine the relationship of the various soils in the area to one another and to similar or identical soils identified in other areas. Soil survey interpretations indicate the limitations and suitability of a soil for selected uses.

A range site is a distinctive kind of rangeland that differs from other kinds of rangeland in its potential to produce native plants. The only criteria used to separate one range site from another are differences in the kinds, proportions, or total annual yield of the climax plant community. Similar soils often have the ability to support similar plant communities and may be grouped in a single range site. Range sites are delineated on maps or aerial photographs to assist the land user in identifying problems and treatment needs for his conservation plan.

Soil surveys and range site mapping have been accomplished on 11,210 acres and 78,720 acres, respectively. The surveys and range site mapping accomplished to date are considered to be adequate for present and anticipated future land uses.

WATER AND RELATED LAND RESOURCE PROBLEMS

Land Management

Application of land treatment measures is difficult due to limited and unpredictable rainfall patterns within the watershed. This factor is very significant for conservation measures applied on rangelands and areas unsuited for irrigation. Differences in amount and distribution of rainfall are reflected in forage production. During years of below average rainfall forage production may be only one-third as much as

during years of high rainfall. Care must be exercised by rangeland operators to insure that desirable vegetation destruction due to overgrazing by livestock does not occur during droughts. Rangeland subjected to overuse during drought periods may require several years of light grazing or total rest to recover their former levels of productivity. Prolonged overgrazing often results in soil loss and an invasion of noxious plants which seriously reduces future production of the resource. Grazing capacity of rangeland in the watershed is limited. A stocking rate of one animal unit to 100 acres or more is often required to obtain proper use of forage species. This limited return per acre restricts the amount of capital which can be reasonably expended on rangeland.

Adequate livestock water is not available in many areas of the watershed. This limits the degree to which planned grazing systems can be implemented. About 1,500 animal units of cattle are estimated to be utilizing rangeland at the present time.

Livestock grazing in the watershed is limited to cattle. There is little competition between cattle and deer for forage. Plants utilized by deer show little evidence of overuse. ^{1/} Deer numbers appear to be declining in the watershed. Reproduction is satisfactory, but fawn survival is low. Declining mule deer numbers have caused some land users to reduce the annual harvest of mule deer by hunters.

Floodwater Damage

Flooding on 13,200 acres of land within the watershed is caused by runoff originating in the mountainous and upland drainage areas of Three-Mile and Sulfur Draw and small unnamed draws. It is estimated that a flood having a predicted recurrence interval of once every 100 years will inundate about 9,040 acres, including 200 acres in the city of Van Horn. However, not all of this area will be inundated by a single flood event. During the interval between floods, minor changes in the area subject to damage, such as installation of small dikes, road fills, irrigation ditches, or land leveling, may alter the course of flood flows. The courses of floodwaters cannot be predicted in the Wild Horse farming area and on rangeland to the west due to overland flow conditions. Most of the damages to urban areas of Van Horn are caused from runoff originating in the Three-Mile drainage area.

About 1,300 acres of flood prone area in the eastern portion of the watershed are common flood plain with Wild Horse Draw. Damages on this common flood plain from floodwater originating in Wild Horse Draw occur on the average of once every 15 years.

^{1/} Personal communication with John Shane, Biologist, Texas Parks and Wildlife Department, Van Horn, Texas, April 1974.



Bridge Damage
Bridge on Highway 54 spanning Sulfur Draw
The south abutment was washed out in August 1966.



Highway 54 road damage
Note sediment deposition.



Floodwater damage to urban property in Van Horn from the flood of September 4, 1913. This flooding was prior to the railroad constructing a diversion around the city of Van Horn.

(Photographs courtesy of Miss Rosa Lee Wylie)



Floodwater damage from flood of August 1966 to irrigation systems in the Wild Horse farming area.



Floodwater Damage from flood of August 1966 in the Wild Horse farming area. Floodwater completely inundated irrigated cotton crop.

The adverse physical and economic effects of flooding have been felt throughout the watershed and have prompted local participation in efforts to alleviate the flood problem. Diversions or levees have been installed in attempts to divert floodwaters from Three-Mile Draw and Sulfur Draw away from the urban area of Van Horn, county air field, and irrigated cropland in the Wild Horse farming area (figure 4).

A diversion protects railroad facilities, the city of Van Horn, and the city cemetery from floods expected to occur on the average of once every 25 years or less. The diversion outlet is east of State Highway 54 about two miles north of Van Horn (figure 4). The outlet is a wide and shallow channel formed by runoff in Three Mile Draw and diverted flow from the diversion. The diversion is semi-compacted earth fill and has received a minimum of maintenance since its construction in 1929. Even though the diversion is adequate for protection from frequently occurring flood flows, it is subject to failure under flood conditions caused by less frequent, more severe, and intense storms.

The floodwater diversion protecting the county air field provides protection from floods expected to occur on the average of once every 10 years or less. It diverts easterly flowing water to the north and discharges into a drainage and bar ditch for Farm Road 2185 (figure 4).

The diversion installed above a portion of the Wild Horse farming area was constructed with private funds to provide protection from floods expected to occur every 10 years or less. Diverted water flows from each end of the diversion to a centrally located outlet and discharges into a waterway designed to contain and convey the 10-year storm runoff to Wild Horse Draw (figure 4).

Damaging floods in the agricultural area can be expected on an average of once every two to three years. Most floods occur during the months of June, July, and August when most crops are highly susceptible to damage. The acreage and location of area inundated is dependent upon the areal extent, intensity, and amount of precipitation falling on the upland and mountainous areas. Cumulative totals of recurrent flooding show an average of 1,515 acres flooded annually during the evaluation period. In addition to causing physical damages (scouring and deposition of sediment) with subsequent reduction of crop yields on agricultural land, other agricultural property such as concrete lined ditches, pipelines, and other appurtenances for water control are severaly damaged by floodwater.

The most disastrous flood in recent years occurred on August 21-22, 1966. Recorded rainfall amounts for this storm varied from 10 inches in the upper portion of the watershed to an official 7.23 inches at Van Horn. 1/

1/ "Climatological Data, Texas, August 1966," U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Data Service.



- LEGEND**
- Federal Route
 - State Route
 - Light Duty Paved Road
 - Dirt Road
 - City Limits
 - Railroad
 - Drainage
 - Watershed Boundary
 - Quarry
 - Existing Diversion
 - Vegetative Waterway
 - Reach
 - Sediment Damage
 - Scour Damage
 - Cutting of Floodway, Sediment and Scour Damage at Age

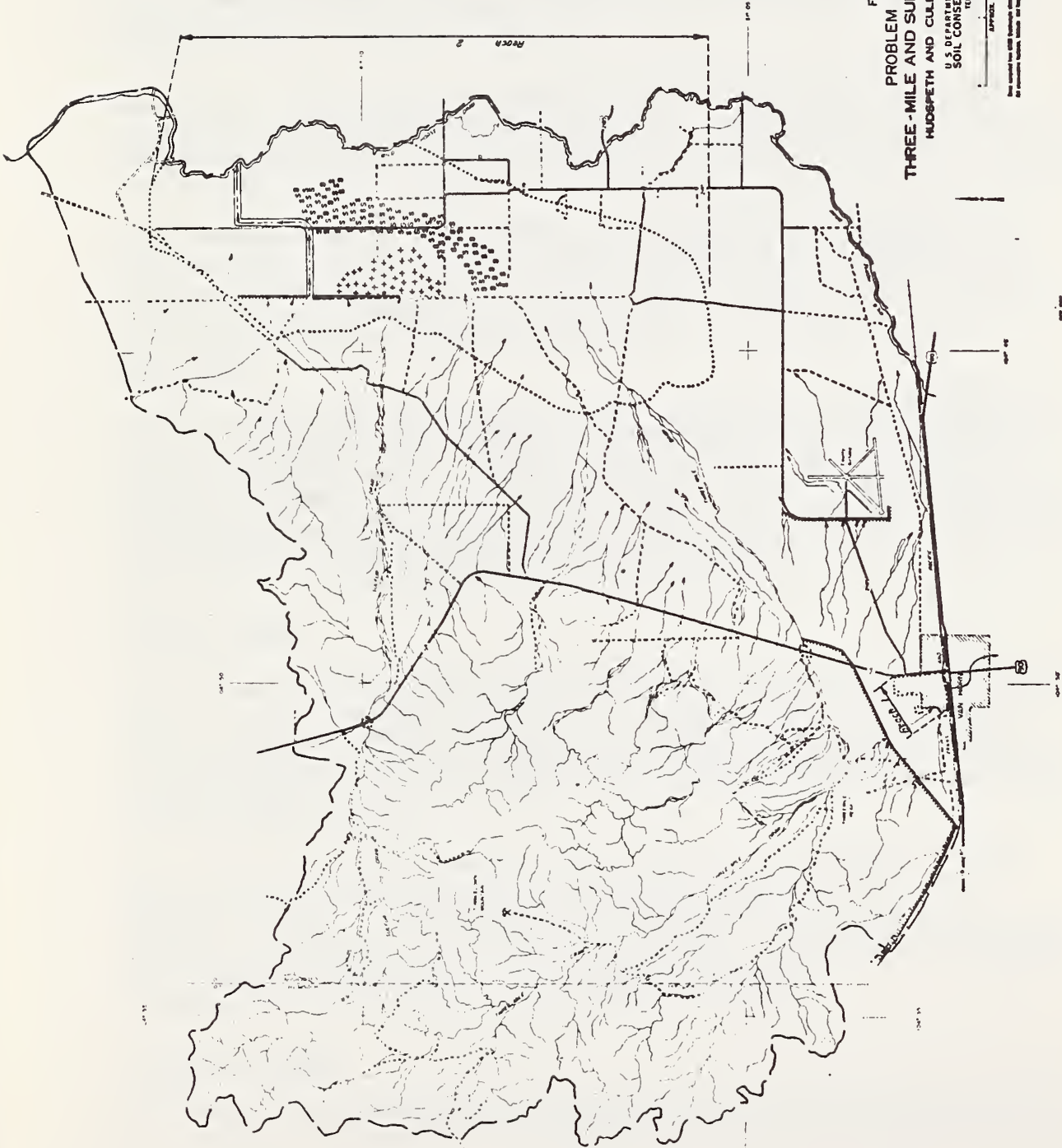


Figure 4
PROBLEM LOCATION MAP
THREE-MILE AND SULFUR DRAW WATERSHED
HUGHES AND CULBERSON COUNTIES, TEXAS

U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE
 TEMPLE, TEXAS
 APPROX. SCALE 1:100,000

The recurrence interval of the resulting flood peak was estimated to be about 25 years. The existing diversion protecting the city of Van Horn and surrounding area was overtopped in several places, but only minor flooding occurred in Van Horn from local runoff. Damage to agricultural and nonagricultural properties was high. Crops were destroyed, irrigation systems were devastated, and cropland was eroded or covered with infertile sediment. State Highway 54, north of Van Horn, was closed for three days because the abutment on the Sulfur Draw bridge was swept away by the rushing waters. Under the present level of development, the direct monetary floodwater damage from such a flood is estimated to be \$306,980.

Other large floods that caused significant floodwater damages to the agricultural area occurred in 1963 and 1964. Large floods that caused damages to properties in Van Horn occurred in 1913, 1927, and 1964. The 1913 and 1927 floods occurred before the existing diversion was constructed.

Under present level of development, it is estimated that approximately 110 homes would suffer direct floodwater damage from a flood having a predicted recurrence interval of once every 100 years. The estimated direct floodwater damages to existing urban properties that would result from such a flood are estimated at \$75,470 at the present level of development.

For the floods evaluated, which include floods up to and including the 100-year frequency, the total direct floodwater damage is estimated to average \$80,900 annually. Of this amount, \$52,260 are crop and pasture damage, \$22,000 are other agricultural damage, \$2,860 are road and bridge damage outside the urban area, and \$3,780 are to urban properties. Of the damage to urban properties, \$3,550 are to residential properties, and \$230 are to city streets and the city cemetery.

Erosion Damage

The estimated average annual upland erosion rate is 0.97 tons per acre. This low rate is primarily because of the infrequency of high intensity rainfall and predominance of stony or gravelly soils on the steeper slopes which are all used as rangeland. Sheet erosion accounts for 87 percent, gully erosion six percent, and streambank erosion seven percent of the upland erosion.

Sheet scour is the significant type of erosion on approximately 840 acres of irrigated cropland and ranges from approximately six to 15 inches in depth. It is estimated that this scour has reduced the productive capacity of 33 acres by 10 percent, 775 acres by 20 percent, and 32 acres by 30 percent. The average annual value of this damage is estimated to be \$47,520 at current normalized prices.

Sediment Damage

About 385 acres of irrigated cropland in the Wild Horse farming area has been damaged by sediment. It is estimated that the productive capacity

of 129 acres has been reduced 10 percent by deposits of silty, clayey sand. The average thickness of these deposits is about one foot. The productive capacity on an additional 256 acres has been reduced 20 percent. The deposits of sediment on this area are comprised of silty sand and small amounts of gravel, averaging about two feet in thickness. At current normalized prices, the average annual sediment damage on 385 acres of irrigated cropland is \$17,650. Deposition is occurring on other areas, but due to land use, nature of soils affected, type of sediment, and low rate of accumulation, the damage was not considered significant, and therefore not evaluated in monetary terms.

On an average annual basis, 13 acre-feet of sediment derived from the watershed is yielded to Wild Horse Draw. This amounts to an average annual sediment concentration of 5,600 milligrams per liter in 0.76 centimeter (0.3 inch) of annual runoff.

In addition to damaging valuable cropland and being a pollutant in runoff water, sediment from the watershed has contributed to channel filling and aggradation in Wild Horse Draw resulting in more frequent and severe flooding.

Indirect Damage

Indirect damages such as interruption of travel, losses sustained by businesses, evacuation of premises when floods threaten, and similar losses are estimated to average \$14,990 annually.

Irrigation Water

Approximately 8,300 acres in the watershed are irrigated cropland. About 4,400 acres are irrigated annually with ground water. The ground water contains considerable amounts of chloride, sodium chloride, and bicarbonate. The content of calcium and sulfate is very low, and there is no residual sodium carbonate. ^{1/}

Accumulations of soluble salts applied to the soil in irrigation water can be a hazard to growing crops. Generally it is not the salt content of the irrigation water that is the problem, but the excessive amounts of salts in the soil that gradually accumulate with repeated application of the water. These accumulations result when water evaporates from the soil surface, leaving the salts as a residue.

Presently the only known method of effectively reducing excessive accumulations of soluble salts is a process known as leaching. This is the removal of the salts in solution from upper soil horizons to lower

^{1/} Longenecker, D.E. and Lyerly, P.J., Some Relations Among Irrigation Water Quality, Soil Characteristics and Management Practices in Trans-Pecos Area, Texas Agricultural Experiment Station MP-373.

horizons by the action of percolating water. Due to their depth and moderate to rapid permeabilities, most of the irrigated soils in the watershed can be leached of excessive accumulations of soluble salts. A slight gypsum content in the soils also contributes to controlling salt accumulations. Presently, due to the effectiveness of leaching and the gypsum content, there are no problems with soluble salt accumulations and none are expected in the future with the use of proper application and management practices for irrigation water.

Recreation

Opportunities for fishing and other water-based recreation are non-existent within the watershed or immediate area. The nearest large lake is Red Bluff Reservoir located about 100 miles to the northeast near the Texas-New Mexico border.

Economic and Social

Additional employment opportunities are needed for the 50 unemployed workers in the area. The population of Van Horn increased from 1,953 persons in 1960 to 2,240 persons in 1970, an increase of 14.7 percent. Further increases in population could be anticipated with a concentrated effort in community development and additional employment opportunities.

RELATIONSHIP TO LAND USE, POLICIES, AND CONTROLS

There are no approved or proposed federal, state, or local land use plans, policies, and controls pertaining to the watershed or surrounding area.

ENVIRONMENTAL IMPACT

The installation of the planned conservation land treatment measures, two floodwater retarding structures, and 55,000 feet of floodwater diversion will achieve the project objectives of watershed protection and flood prevention.

Eighty-eight percent of the watershed will have received conservation land treatment measures essential to its protection. Average annual reduction of flood damage to agricultural flood prone lands will exceed the 70 to 75 percent objective. Flood damages resulting from all floodwater up to and including a predicted 100-year event will be eliminated.

Land Treatment

The installation of conservation land treatment measures on 26,420 acres of land in addition to effectively maintaining those already applied will protect soil, water, and related resources by preventing soil erosion, reducing water pollution by sediment, conserving irrigation water, increasing infiltration, and reducing runoff. Land users in the

flood prone area will be able to improve their management of the area with the application and use of additional land treatment measures after a reduction in flooding is effected.

Conservation cropping systems and crop residue management will provide soil protecting cover which will improve or maintain soil productivity and tilth. Crop residues which are properly managed increase the ability of soils to retain moisture and reduce the loss of organic matter and nutrients. Irrigation water management and irrigation land leveling provide for more efficient use of irrigation water and prevent erosion through application of the water.

The application of pastureland treatment measures, including pasture planting and proper management, will protect the soil and decrease the rate of runoff by providing a good ground cover on this intensively used land.

The application of rangeland treatment measures, including proper grazing use, planned grazing systems, and deferred grazing, will increase the productivity and density of desirable grasses and forbs normally found in the natural plant community. Increasing the density of grasses and forbs will reduce erosion by improving the protective cover from poor and fair condition to fair and good condition. This will improve forage conditions for livestock and habitat for wildlife in the watershed. Wells, pipelines, and troughs installed for watering livestock will reduce livestock travel and distribute grazing to prevent overuse of vegetation near sources of water and underutilization of vegetation at greater distances from water.

After the project is complete, the level of accomplishment for needed land treatment is expected to reach 88 percent, a 36 percent increase over present conditions.

Application of the planned land treatment is expected to reduce annual gross erosion from 92,500 tons to 85,760 tons, a reduction of approximately 7 percent.

Structural Measures

When the project is complete, annual erosion damage to 840 acres in the flood prone area is expected to be reduced 86.4 percent. A 90.5 percent reduction in sediment deposition damage on 385 acres will be affected. The average annual sediment yield from the watershed to Wild Horse Draw will be reduced from 13 acre-feet to 5 acre-feet. The concentration of sediment in 0.76 centimeter (0.3 inch) of average annual watershed runoff will be reduced from 5,600 to 1,600 milligrams per liter, a 71.4 percent reduction.

Flood protection will be provided to 13,200 acres of flood plain land within the watershed and will benefit directly the owners and operators

of approximately 15 farms and ranches in the flood plain and the owners and occupants of 110 residential units. In addition, land users of land along Wild Horse Draw adjacent to and downstream from the watershed will receive some benefits from the project. Indirect benefits include the reduction or elimination of expenses associated with interruption or delay of travel, rerouting of school buses and mail routes, disruption of farm operations, business losses in the area, and similar losses.

After installation of the combined program of land treatment and structural measures, average annual flooding will be reduced from 1,515 acres to 50 acres, a reduction of 96.7 percent.

Reduction in area inundated varies with respect to location within the watershed. The general locations of the areas to be benefited as a result of reduced flooding, caused by the combined program of land treatment and structural measures are presented in the following tabulation:

| Average Annual Area Inundated | | | | |
|-------------------------------|-----------------------------|----------------------------|-------------------------|------------------------|
| Evaluation | Location | Without Project (acres) | With Project (acres) | Reduction (percent) |
| 1 | Urban Area-City of Van Horn | 5 | 0 | 100 |
| 2 | Agricultural Area | 1,510 | 50 | 97 |
| TOTAL | | 1,515 | 50 | 97 |

The number of acres inundated in each evaluation reach without and with the project by various frequency floods is presented in the following tabulation:

| Evaluation | Area Inundated by Selected Recurrence Intervals | | | | | | | |
|------------|---|--------------|-----------------|--------------|-----------------|--------------|-----------------|--------------|
| | 2-Year | | 5-Year | | 25-Year | | 100-Year | |
| Reach | Without Project | With Project | Without Project | With Project | Without Project | With Project | Without Project | With Project |
| (figure 4) | (acres) | (acres) | (acres) | (acres) | (acres) | (acres) | (acres) | (acres) |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 200 | 0 |
| 2 | 560 | 10 | 2,860 | 60 | 5,960 | 190 | 8,840 | 290 |
| TOTAL | 560 | 10 | 2,860 | 60 | 5,960 | 190 | 9,040 | 290 |

Had the project been installed at the time of the 1966 flood, acres flooded would have been reduced from about 5,969 acres to 190 acres, a reduction

of approximately 96.8 percent. Direct floodwater damages would have been reduced from an estimated \$306,980 to \$9,150, a reduction of 97.0 percent.

The following tabulation shows effects of the project on flood damages by evaluation reaches.

| Damage Reduction in Percent 1/ | | | | | | |
|--------------------------------|------------------|---------------------|-------------------|----------|---------------------|-------|
| Evaluation Reach (figure 4) | Crop and Pasture | Other Agri-cultural | Non-Agri-cultural | Sediment | Flood Plain Erosion | Total |
| 1 | - | - | 100.0 | - | - | 100.0 |
| 2 | 96.7 | 96.7 | 95.1 | 90.1 | 86.0 | 92.3 |
| Weighted Average | 96.7 | 96.7 | 97.9 | 90.1 | 86.0 | 92.5 |

1/ Reduction based on consideration of floods up to and including the 100-year frequency event.

Floodwater Retarding Structure No. 2 will complement the existing diversion above the city of Van Horn by providing protection from floods having a predicted recurrence interval of once every 100 years. Presently this diversion is subject to overtopping by runoff from a storm with an expected recurrence interval of 25 years. With the installation of Floodwater Retarding Structure No. 2, the potential for overtopping and possible failure of the diversion will decrease significantly. The floodwater retarding structure will control runoff from 16,966 acres. Under without project conditions, this runoff would either be controlled by the existing diversion or overtop the diversion possibly causing it to fail and become a menace to Van Horn. The residents of Van Horn, when Floodwater Retarding Structure No. 2 is constructed, will have an increased sense of security by knowing their lives and properties are more adequately protected from the threat of floodwaters.

A maximum initial reduction in average annual runoff of 60 acre-feet is expected from the effects of evaporation from sediment pools of the floodwater retarding structures. This will result in an initial reduction from 2,380 to 2,320 acre-feet, 2.5 percent, in average annual volume of watershed runoff. This initial water loss in the floodwater retarding structures will be reduced as sediment accumulates in the sediment pools over the life of the project. Most of the 60 acre-feet volume, however, can be expected to evaporate under present conditions on its way to or after it reaches Salt Basin.

The installation of two floodwater retarding structures and 55,000 feet of floodwater diversion will require the commitment of a total of 1,781 acres of rangeland to project purposes. A total of 594 acres of this rangeland required for dams, emergency spillways, sediment pools, auxiliary borrow areas, and will be retired from agricultural production as its primary use.

During construction of the structural works of improvement, air and water pollution will increase slightly from dust and sediment inherent to the construction process. This increase will be kept within tolerable limits. At the end of construction and with the establishment of erosion control measures, the dust and sediment increase intrinsic to construction operations will have completely subsided.

There are no areas such as feed lots in the watershed with large concentrations of livestock. Livestock within the drainage areas of the floodwater retarding structures are on rangeland. Due to the low carrying capacity of approximately one animal unit per 100 acres of rangeland, appreciable contamination from livestock to water in the sediment pools is not anticipated.

The sediment pools of the floodwater retarding structures will provide an intermittent water supply for livestock.

Irrigation systems and appurtenances on 15 farms in the Wild Horse farming area will be protected from floodwater originating in the watershed. The area will be secure from floods caused by a one percent chance (100-year) flood event. In addition to maintaining and improving systems now in use, land users can invest in new irrigation systems and equipment without fear of damage or destruction from erosion, sediment, and floodwater.

Water impounded in the sediment pools of the floodwater retarding structures will be of excellent quality for irrigation uses. However, these sources of water are expected to be very unreliable. Low annual precipitation, high evaporation rates, and filling of the pools with sediment are factors effecting this unstable condition. During times of drought, when the need for water could be the greatest, the sediment pools will possibly be completely dry. The floodwater retarding structures are located about eight miles from the Wild Horse farming area. It would be highly speculative to invest in equipment to pump and convey water from these sources to where it would be utilized. In the event water from these sources should be used for irrigation, appropriate water rights permits, as required by Texas water rights statutes, will be needed from the Texas Water Rights Commission.

The construction and functioning of the floodwater retarding structures and floodwater diversion will not affect mineral resources. Project planners, which included Soil Conservation Service geologists and engineers, were aware of the locations of the Hazel Mine and talc deposits during development of the work plan. Floodwater Retarding Structure No. 1 is located about 2.5 miles downstream from the Hazel Mine, and Floodwater Retarding Structure No. 2 is approximately 5.0 miles downstream from the talc deposits. There will be no hazard to these resources from water temporarily detained in the structures' retarding pools. During and after construction of the structures, present ingress and egress conditions to the mine and talc deposits will

not be significantly affected. There will be no public roads affected in the vicinity of the site for Floodwater Retarding Structure No. 1. However, a private road maintained by the county, which is an access route to the talc deposits, will require modification or rerouting in the vicinity of the Floodwater Retarding Structure No. 2 site to remain in a passable condition. This will be accomplished by the Culberson County Commissioners Court prior to the initiation of construction operations or in a timely manner that normal traffic will not be impeded.

The effects of the works of improvement on fish and wildlife habitat are described by the Fish and Wildlife Service as follows:

"With the project, there is a possibility that one or perhaps both floodwater retarding structures would hold water during non-drought years. Preliminary information suggests that significant year-round storage may occur on the average of every other years. With the scarcity of sport fishing in this semi-arid region, the Texas Parks and Wildlife Department would be willing to stock such an impoundment when conditions are at all favorable for fish survival. While less than ideal, the resulting fishery would provide significant sport fishing opportunities.

If the reservoirs do not hold water during non-drought years, no fishing of any kind would result from the project.

Without the project, future wildlife populations are expected to remain at about their present levels.

With the project, the construction of floodwater retarding structures and the implementation of some land treatment measures are expected to improve wildlife habitat.

The construction of the floodwater retarding structures periodically would provide new sources of water in an area where the shortage of drinking water is a limiting factor to many species of wildlife. Stable vegetative borders would become established along the more permanent pool levels and immediately below the dams where floodwater releases would encourage vegetative growth. The resulting vegetative cover would offer some wildlife refuge. Reservoirs retaining water during the spring and fall months would benefit waterfowl by providing resting areas during migration flights. The habitat of ground-nesting birds and other lowland game species would be improved below the floodwater retarding structures and the floodwater diversion structure with the reduction in severity and frequency of floods.

Land treatment measures that can be expected to enhance wildlife and deferred grazing, range seeding, and proper grazing use. Also included would be construction of additional stock watering facilities. These practices would improve the general vegetative

cover conditions, increase the number of available wildlife drinking points, and provide a better distribution of watering facilities throughout the project area.

An insignificant amount of wildlife habitat of minimal value would be destroyed with the construction of the floodwater retarding structures and the floodwater diversion structure."

The sediment pools at the elevations of the lowest ungated outlets will initially have the capability to impound 48 acres of water surface. Due to a low amount of annual precipitation, high evaporation rate, and anticipated filling of the pools with sediment, these impoundments are not expected to be a dependable habitat for a fisheries resource. It is possible these sediment pools will be completely dry during times of drought. However, the ecological diversity will be increased by the creation of temporary wetland habitat which presently does not exist in the area. When inundated, the 48 acres of area will be lost as upland wildlife habitat.

About 78 acres will be required for the construction of dams and emergency spillways. Vegetation on areas other than bare rock which presently serves as limited habitat for wildlife will be removed. The area needed for installation of the dam and emergency spillway of Floodwater Retarding Structure No. 1 is bare rock except for isolated areas of soil which support a sparse stand of yucca (Yucca spp.) and creosotebush. The dam and emergency spillway of Floodwater Retarding Structure No. 2 supports a sparse stand of creosotebush, yucca, lecheguilla, and catclaw (Acacia greggii). A maximum of 86 acres will be needed for auxiliary borrow areas. These areas support vegetation similar to that found on Floodwater Retarding Site No. 2.

The vegetative cover and the wildlife habitat value of the 171 acres in the floodwater retarding and sediment reserve pools will undergo insignificant changes as a result of installation of the floodwater retarding structures.

Construction of the floodwater diversion will require 382 acres of rangeland. Vegetative cover and wildlife habitat value on this area will be destroyed during construction. Vegetation on the areas to be affected is composed of a scattered stand of creosotebush, lecheguilla, broom snakeweed (Gutierrezia sarothrae), and mesquite. The predominate grasses are fluffgrass, tobosa, threeawns, hairy tridens, and annuals. Some annual weeds exist which provide food for scaled quail. Deer habitat is poor due to a lack of adequate cover in or near the vicinity of the proposed floodwater diversion. Estimated total vegetative production is less than 200 pounds per acre of which about 10 percent has forage value for livestock or wildlife.

With the exception of the 382 acres needed for construction and functioning of the floodwater diversion, the vegetation and fauna on the intervening area between the planned floodwater retarding structures and the

Wild Horse Farming Area are expected to experience only minor changes after construction. After installation of the floodwater diversion about 400 acres of this rangeland below the diversion, which has essentially the same vegetative composition as the 382 acres needed for construction, will be deprived of runoff they would have otherwise received. The principal effect of the reduction in moisture will be a lessening in density of grasses and weeds that are present. It is expected that this effect will extend to about 300 feet below the diversion and progressively decrease as distance increases from the structure. The reverse effect can be expected above the floodwater diversion; areas presently receiving small amounts of runoff will be subjected to relatively large quantities moisture. It is in these areas that vegetative density and quality will increase.

The 400 acres below the planned floodwater diversion are presently of minimal value as wildlife habitat. Impacts on wildlife in the area will be minor with the increase in vegetative density and quality above the diversion. With the prevailing climatic conditions, the availability of water is a principal factor determining the growth and reproduction of desirable plants providing habitat for wildlife. The diversion will concentrate runoff and overflow along a defined course, rather than overland type flow, and provide more moisture which will result in higher quality habitat for wildlife in the area.

Presently there are no known locations of historic significance in the watershed that would be affected by installation of the project.

The immediate direct effects of construction operations on archeological resources, as appraised by the Archaeology Research Program, Southern Methodist University, and concurred in by the State Historic Preservation Officer are as follows:

| <u>Site No.</u> | <u>Effects</u> |
|-----------------|--|
| X41CU1 | Will be disturbed by construction of floodwater diversion. |
| X41CU2 | Will not be disturbed by construction of diversion. . |
| X41CU3 | Located within detention pool of Floodwater Retarding Structure No. 1. Will be subject to occasional inundation by floodwater. |
| X41CU4 | Located above detention pool elevation of Floodwater Retarding Structure No. 2. Will not be affected by construction or inundation of water. |
| X41CU5 | Located above detention pool elevation. Will not be affected by construction or impoundment of water. |

- X41CU6 Will be disturbed by construction of floodwater diversion.
- X41CU7 Will be disturbed by construction of floodwater diversion.
- X41CU8 Will be disturbed by construction of floodwater diversion.
- X41CU9 Will be disturbed by construction of the embankment of Floodwater Retarding Structure No. 1.
- X41CU10 Partially located within detention pool of Floodwater Retarding Structure No. 2. Part of site will be subject to occasional inundation by floodwater.
- X41CU11 Located below embankment of Floodwater Retarding Structure No. 2. The original centerline of the structure was relocated to avoid disturbing archeological site.

Economic and Social

The application of the planned land treatment will result in more efficient use of irrigation water, cropland, and grassland. This will improve farm and ranch income.

Secondary benefits, from the installation of a complete project for flood prevention, will accrue in the trade area as a result of increased business to those who furnish farming equipment, petroleum products, seed, farm supplies, repair services, and various other services associated with the farming and ranching community. Increased agricultural efficiency will be realized by the operators of land that will become more productive after damaging floods, sediment, and scour have been alleviated. The increased agricultural production will provide added income, thereby improving the standard of living. The increased needs of the entire economy will create the equivalent of 20 permanent jobs for local residents. ^{1/} The operation and maintenance of project measures will also provide employment for local residents. Additional intangible benefits will accrue to the project allowing an opportunity for the shifting of public funds from the repair of damages to county roads and bridges to investment in schools and improving existing roads. Likewise, private funds now going to repair of flood damage could be shifted to raising the standard of living of the residents of the affected area.

^{1/} Estimated from an adaptation of An-Input-Output Analysis of the Texas Economy Emphasizing Agriculture, Lonnie L. Jones and Gholam Mustafa, Texas A&M University, November 1971.

It is estimated that the project will produce local secondary benefits averaging \$33,230 annually. 1/ Secondary benefits from a national viewpoint were not considered pertinent to the economic evaluation.

During the construction stage of the proposed project, additional requirements for construction materials, petroleum products, and other necessities will stimulate the economy. The firms contracting for installation of the floodwater retarding structures will employ some of their employees locally. This construction will create approximately 43 man-years of employment, which will further strengthen the economy during the construction phase. 2/

The elimination or reduction of flooding will allow owners of residential units to upgrade their properties, thereby creating a more pleasant environment in which to live. Significant intangible public health benefits will accrue in the city of Van Horn, including reduced hazards of loss of life and injury, elimination of health hazards associated with damage to water supply and waste disposal systems, improved vector control, and the prevention of other factors accompanying floods which tend to disrupt the maintenance of public health facilities.

The estimated average annual monetary floodwater, sediment, flood plain erosion, and indirect damages within the watershed will be reduced from \$161,060 to \$12,100 by the proposed project. This is a reduction of 92.5 percent.

Benefits to landowners and operators from the planned land treatment measures were not evaluated in monetary terms since experience has shown that conservation practices produce benefits in excess of their costs.

Reduction in monetary flood damages vary with respect to locations within the watershed. The following tabulations show the general locations of the damage reduction benefits attributed to the combined program of land treatment and structural measures.

1/ Estimated from an adaption of Upper Rio Grande Valley - Texas Inter-industry Study, Texas Interindustry Project, Office of the Governor, Division of Planning Coordination, April 1972.

2/ Estimated from an adaptation of An Input-Output Analysis of the Texas Economy Emphasizing Agriculture, Lonnie L. Jones and Gholam Mustafa, Texas A&M University, November 1971.

| Average Annual Damage Reduction 1/ | | | | | |
|------------------------------------|-------------------------------|----------|-----------------|--------------|-----------|
| Evaluation | Reach | Location | Without Project | With Project | Reduction |
| (figure 4) | | | (dollars) | (dollars) | (percent) |
| 1 | Urban Area - City of Van Horn | | 4,540 | 0 | 100.0 |
| 2 | Agricultural Area | | 156,520 | 12,100 | 92.3 |
| TOTAL | | | 161,060 | 12,100 | 92.5 |

1/ Reduction based on consideration of floods up to and including the 100-year frequency event.

| Direct Monetary Floodwater Damage | | | | | | | | |
|-----------------------------------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Evaluation: | Recurrence Interval | | | | | | | |
| | 2-Year | | 5-Year | | 25-Year | | 100-Year | |
| Reach | Without | With | Without | With | Without | With | Without | With |
| (figure 4) | Project | Project | Project | Project | Project | Project | Project | Project |
| | (dollars) | (dollars) | (dollars) | (dollars) | (dollars) | (dollars) | (dollars) | (dollars) |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 75,470 | 0 |
| 2 | 27,500 | 400 | 148,960 | 2,950 | 306,980 | 9,150 | 449,100 | 21,570 |
| TOTAL | 27,500 | 400 | 148,960 | 2,950 | 306,980 | 9,150 | 524,570 | 21,570 |

A summary of economic findings is attached as Appendix A.

FAVORABLE ENVIRONMENTAL EFFECTS

1. The application of the planned land treatment will maintain or improve soil, water, and related resources by:
 - a. increasing soil productivity and tilth,
 - b. reducing erosion by about seven percent,
 - c. improving hydrologic cover, thereby decreasing watershed runoff and increasing infiltration,
 - d. improving forage conditions for livestock,
 - e. creating more locations providing drinking water for livestock, and

- f. providing for more efficient use of irrigation water.
2. Annual erosion damage to 840 acres in the flood prone area will be reduced by 86.4 percent.
3. Sediment damage to 385 acres in the flood prone area will be reduced 90.5 percent.
4. The concentration of sediment in 0.76 centimeter (0.3 inch) of average annual watershed runoff will be reduced from 5,600 to 1,600 milligrams per liter, a 71.4 percent reduction.
5. Owners and operators of 15 farms and ranches in the flood prone area will benefit from a decrease in average annual flooding of 1,515 acres to 50 acres, a 96.7 percent reduction.
6. Expenses and inconveniences associated with interruption or delay of travel, rerouting of school buses and mail routes, disruption of farm operations, and business losses due to flooding will be eliminated or greatly reduced.
7. About 110 residential units in Van Horn will be provided protection from a flood having a predicted recurrence interval of once every 100 years.
8. Water from sediment pools of the floodwater retarding structures will provide an intermittent water supply for livestock.
9. Irrigation systems and equipment in the Wild Horse farming area will be protected from damage or destruction caused by erosion, sediment, or floodwater.
10. Wildlife in the watershed will be affected as follows:
 - a. Two limited and temporary sources of drinking water would be provided by sediment pools following construction of planned structures.
 - b. If there should be water impounded in the sediment pools during the spring and fall months, resting areas would be provided for migrating waterfowl.
 - c. With the availability of more water in and around the floodwater retarding structures and diversion, more desirable and dense vegetation can be established offering improved wildlife habitat.
 - d. Temporary wetland habitat will be created in an area where none presently exists.

- e. The habitat of ground-nesting birds and other lowland wildlife species will be improved with the reduction in severity and frequency of floods.
 - f. Land treatment measures such as proper grazing use, deferred grazing, and livestock watering installations designed for wildlife use will benefit wildlife by improving habitat and increasing the amount and distribution of water.
11. An impetus for a higher quality of living and social upgrading will be provided through reduced flood damages.
 12. Increased economic activity will create the equivalent of 20 permanent jobs for local residents.
 13. Construction of the structural measures will create approximately 43 man-years of employment.
 14. Public and private funds presently used to repair flood damages can be shifted to more permanent investments that improve the quality of living.
 15. Significant intangible public health benefits will accrue to residents in the city of Van Horn which will include reduced hazards to loss of life and injury, elimination of health hazards associated with damage to water supply and waste disposal systems, and the prevention of other factors accompanying floods which tend to disrupt the maintenance of public health facilities.

ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

1. Dust and sediment pollution will increase slightly during construction of the structural works of improvement.
2. Upland wildlife habitat of minimal value on 48 acres in the sediment pools will be lost; habitat of similar value will be destroyed on 86 acres needed for auxiliary borrow areas and 382 acres required for installation of the floodwater diversion.
3. Forage for approximately three animal units of livestock will be temporarily destroyed in the areas required for construction of dams, emergency spillways, borrow areas, and the diversion.
4. Eight archeological sites, none of which are considered eligible for nomination to the National Register of Historic Places will be affected by either disturbance during construction or occasional inundation by floodwater.

ALTERNATIVES

The considered alternatives to the proposed action were: (1) a program of applying land treatment measures for watershed protection; (2) changing the present use of agricultural land to a use less susceptible to damage by flooding, application of land treatment, and purchase of flood prone areas with relocation of homes and improvements; (3) floodproofing of buildings and other improvements and, as in Alternative No. 2, change in agricultural land use and applying land treatment; (4) altering the existing floodwater diversion protecting Van Horn or constructing a new floodwater diversion and as in Alternative No. 2, changing the agricultural land use in the flood prone area and applying land treatment; and (5) foregoing the implementation of a project. Studies indicate there are no alternative floodwater retarding structure locations or floodwater diversion alignments that will not impact upon archeological sites.

A discussion of each alternative follows:

Alternative No. 1 - Alternative No. 1 consisted of only applying the land treatment measures as proposed in the project action. The impacts of the application of land treatment measures are discussed under the ENVIRONMENTAL IMPACT section which describes the proposed project action. Average annual floodwater flood plain erosion, and indirect damages would be reduced from \$161,060 to \$152,820, or a reduction of 5.1 percent. The volume of sediment being delivered to Wild Horse Draw would be reduced from 13 acre-feet to 12 acre-feet annually, a reduction of about 8 percent. This alternative would have very little effect in reducing scour on the cultivated flood plain and in reducing the volume of sediment produced by this process. The adverse impacts that would be caused by installation of the structural measures would be eliminated as would be the favorable impacts. Effects on fish and wildlife from land treatment would generally be the same as the planned project. Elimination of existing vegetation on the areas to be disturbed by construction would be avoided. The estimated cost of this alternative is \$190,300.

Alternative No. 2 - Alternative No. 2 consisted of changing the present use of irrigated agricultural land to a use less susceptible to damage by flooding, application of land treatment, and purchase of flood prone areas with relocation of homes and improvements.

The potential land uses, listed in order from highest to lowest susceptibility of flood damage, are urban and built-up areas, cropland, pastureland, and rangeland. Land used for other purposes, such as transportation systems and wildlife-recreation land, are damaged to varying degrees by flooding, depending upon the type of development and depth and duration of flooding.

In order to reduce the need for flood protection, it would be necessary to relocate 15 homes and associated improvements to

assure flood-free protection to floor levels from a 100-year event within the urban area of Van Horn. It would also be necessary to move the city cemetery and change the land use on about 4,400 acres of land used for growing crops. The land could be used for rangeland or wildlife-recreation land, if extensive developments were not installed.

This alternative would reduce the actual monetary damage caused by floodwater, sediment, and erosion. The 95 homes for which relocation is not considered would continue to suffer damage to foundations, yards, outbuildings, and similar properties. Changing the land use from cropland to rangeland would reduce the food supply for many species of wildlife that are present in the watershed. Damages to the transportation system would continue at approximately the same rate because it was determined to be impracticable to move the system out of the flood hazard area. The gross income to the owners and operators of the 4,400 acres of irrigated cropland would be reduced by about \$1,431,850 annually, if the land use were changed to rangeland. In addition, if the land was purchased or diverted by government action, tax revenues lost to the county and school district would be about \$5,400 annually. The concentration of sediment in runoff leaving the watershed would continue at about 5,600 milligrams per liter.

The relocation of 15 residences and the city cemetery would require changed land use on the land needed for relocations. The use of 1,781 acres of land for installation and functioning of the structural measures and the resultant adverse impacts would be eliminated. The need to remove existing vegetation on areas to be disturbed by construction would be eliminated.

The application of land treatment measures and resultant effects on areas presently being used as rangeland and on about 3,900 acres of irrigated cropland would be essentially the same as in the proposed project action. The 4,400 acres of cropland requiring conversion to rangeland would need application of land treatment measures such as range seeding, proper grazing use, and deferred grazing. Livestock fences and watering facilities would also be needed. Wildlife upland habitat management would also be practiced to assure minimum adverse effects on wildlife in the area. The major impacts on wildlife would be a reduction in the seasonal food source from grain sorghum, and the increase in cover provided by perennial and annual vegetation that would be established. Point sources of water would be reduced with the reduction of cropland irrigation; however, with the installation of livestock watering facilities adapted for wildlife use, more dependable sources of water on a year-round basis would become available.

The cost for implementing this alternative is estimated to be \$2,127,830 of which \$162,830 are for land treatment; \$1,650,000 are

for agricultural land acquisition; and \$315,000 are for relocation of residences and the city cemetery in Van Horn.

The gross average annual benefits from implementation of this alternative are estimated to be \$4,850.

Alternative No. 3 - This alternative consisted of floodproofing existing buildings and improvements and, as in Alternative No. 2, changing the land use on irrigated agricultural land in the flood hazard area and applying land treatment.

Early in planning it was recognized by the sponsors and project planners that if floodproofing of improvements in the urban area of Van Horn and the cemetery was to be accomplished, it would behoove all concerned to disregard the function of the floodwater diversion constructed by the railroad company. The diversion is constructed of uncompacted earth materials and has received a minimum of maintenance. It has been demonstrated by the 1966 flood that a storm with a 25-year recurrence interval will cause floodwater to flow over the top of the diversion. Considering the method of construction, materials used, and amount of maintenance, a storm with an expected occurrence interval of 25 years or more would subject the diversion to failure. It is conceivable that a diversion failure would channel floodwater into the urban area, causing greater damage than if there were no diversion (see drainage patterns on figure 4 or Appendix B).

A reconnaissance-type survey of urban properties indicated that floodproofing could be accomplished on most of the improvements. This would include preventive measures such as constructing dikes or levees around brick, stucco, and other non-movable structures or installations; and elevating frame or movable structures.

The cost of floodproofing that will provide flood-free protection to floor levels from a 100-year recurrence interval flood (one percent chance) is estimated to be \$45,000. The impacts and cost of changing the use of the irrigated agricultural land and applying land treatment would be the same as in Alternative No. 2. The effects on wildlife would be essentially the same as Alternative No. 2. Average annual benefits from this alternative would be the same as those from Alternative No. 2.

Alternative No. 4 - This alternative consisted of altering the existing floodwater diversion or constructing a new floodwater diversion and, as in Alternative No. 2, changing the use of irrigated agricultural land in the flood prone area and applying land treatment.

Engineering investigations and studies indicate it would not be feasible to increase the height of the existing floodwater diversion

to provide additional flood protection. As previously stated, the diversion is constructed of uncompacted earth materials and has received a minimum of maintenance. These conditions would require extensive alterations be made before additional flood protection to the urban area of Van Horn could be effected. In fact, to provide a dependable floodwater diversion that would protect the urban area from a flood with a 100-year recurrence interval, it would be necessary to completely rebuild the existing diversion or construct a new one.

To alter the existing diversion or construct a new floodwater diversion would require 220 acres of land. Under present conditions, there would be no displacement or relocation of farm and ranch operations, businesses, or individuals. The impacts on vegetation and wildlife in the 220 acre area required would be essentially the same as those described for installation of the proposed floodwater diversion in the project. The monetary input for construction is estimated to be \$600,000. The impacts and cost of changing the use of the agricultural land would be essentially the same as Alternative No. 2. Existing vegetation in the area needed for levee construction would be eliminated. Average annual benefits from implementation of this alternative would be the same as those from Alternative No. 2.

Alternative No. 5 - Alternative No. 5 consisted of foregoing the implementation of a project.

Foregoing any type of project action would result in continued flood damage to agricultural and urban areas. There would be a reduction in priority of technical assistance to watershed land users for all segments of land treatment. This would have an adverse effect on grassland ecosystems and reduce the ability of these ecosystems to support a livestock industry. Wildlife resources would also be adversely affected.

Irrigation systems on cropland would continue to be damaged by recurring floods and improvements to existing systems would not be feasible without flood protection. Operation of marginal and inefficient irrigation systems results in waste of ground water and reduces agricultural production. Erosion and resultant sediment deposition would continue.

The need to use 1,781 acres of land for the installation and functioning of the structural measures and the resultant impacts would be eliminated.

The opportunity to realize about \$103,220 in average annual net benefits would be foregone.

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S
ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT
OF LONG-TERM PRODUCTIVITY

Most of the land in the watershed is used for agricultural production and is not expected to undergo a significant change in the future. The overall projected land use in the watershed at the end of the project installation period is as follows:

| <u>Land Use</u> | <u>Acres</u> | <u>Percent</u> |
|-------------------------|--------------|----------------|
| Cropland (irrigated) | 10,000 | 10.5 |
| Pastureland and Hayland | 120 | 0.1 |
| Rangeland * | 82,210 | 86.2 |
| Miscellaneous ** | <u>3,030</u> | <u>3.2</u> |
| Total | 95,360 | 100.0 |

* Includes 8,800 acres used primarily as wildlife-recreation land

** Includes roads, highways, railroad rights-of-way, urban area, farmsteads, ranch headquarters, airport, floodwater retarding and diversion structures, etc.

However, the planned land treatment is flexible for meeting treatment needs for improving soil, water, vegetative, and related resources should significant land use changes occur. The project will provide a level of protection consistent with the needs of the highly developed and intensively cultivated Wild Horse farming area, the large area of rangeland in the watershed, and the urban area of Van Horn. The project provides a foundation for the protection and conservation of land, water, and related resources of the area and will complement any other water resource development programs undertaken to utilize runoff from other areas draining into Salt Basin.

Presently, Cornudas, North, and Culp Draws Watershed and Hitson, C&L, and Washburn Draws Watershed have been planned under the auspices of Public Law 566 and have been authorized for construction operations. Cornudas, North, and Culp Draws; Hitson, C&L, and Washburn Draws; and Three-Mile and Sulfur Draw watersheds are the only watersheds draining into Salt Basin on which, under present conditions, construction of structural works of improvement are feasible. Total drainage area of the three watersheds is 739 square miles (472,960 acres) or about 4.2 percent of the 17,476 square mile drainage area of Salt Basin.

With installation of the three watershed projects, 6 floodwater retarding structures, 2 multiple-purpose structures, and 80,150 feet of floodwater diversion will have been constructed.

It is anticipated that the works of improvement proposed in the Three-Mile and Sulfur Draw watershed project along with works of improvement in the other two planned projects will have significant effects on quality of the human environment. Long-term cumulative impacts of projects in the Salt Basin area are as follows. The works of improvement, both land treatment and structural, will help contribute to the conservation, development, and productive use of soil, water, and related resources. The projects will allow productivity of the resources to be sustained economically and in an orderly manner. The standard of living of residents in the area will be improved through added income. The projects will restrict use of the land needed for installation of the works of improvement. Some wildlife habitat will be disturbed or destroyed during construction of the floodwater retarding and multiple-purpose structures and floodwater diversions. However, overall habitat conditions are expected to become more favorable as a result of temporary impoundment of water in the sediment pools.

Long-term habitability and contribution to the economic well being of the area will be improved with only minimal detriment to a few features of the existing environment. In total, the natural environment and aesthetic values of the area will be benefited over those that would exist in the long-term without the project.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The project will commit about 1,781 acres of agricultural land to construction and functioning of the structural measures. All this land is rangeland. The dams and emergency spillways will require 78 acres, sediment pools below the lowest ungated outlets 48 acres, and the floodwater diversion 382 acres, all of which will be retired from agricultural production. Floodwater retarding pools will require 171 acres which will be subject to temporary inundation from time to time. An additional 996 acres will be needed for conveyance of floodwater along and below the floodwater diversion. Soil materials on 86 acres of auxiliary borrow area will be subject to removal and use for construction of dams.

Commitment of labor and material resources will be irretrievable.

No other permanent commitment of resources is known to be required for this project.

CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

General

The plan was developed in full consultation and cooperation with all interested agencies and individuals. Prior to initiation of planning

and during the planning phase, informational meetings were held by local organizations in Van Horn. The initial meeting was held in December 1964 by 23 interested citizens. It was recognized at this meeting that favorable public opinion toward a watershed project was needed before submitting an application for planning assistance to the Texas State Soil and Water Conservation Board. It was also emphasized at this meeting that under the auspices of Public Law 566, a watershed project would be a local endeavor with federal assistance.

Subsequent to approval of the application, a field examination of Three-Mile and Sulfur Draw watershed was carried out in December 1964, by the Texas State Soil and Water Conservation Board and Soil Conservation Service, to make an appraisal of watershed problems, type of improvements necessary for watershed protection and flood prevention, quality of human environment, and effects of possible works of improvement on the environment. Findings of the field examination were publicly discussed at a meeting held for this purpose at Van Horn.

A field reconnaissance of Three-Mile and Sulfur Draw watershed and a public hearing were held by the Texas State Soil and Water Conservation Board in Van Horn, Texas. The field reconnaissance and hearing provided assurance to Board members that requested assistance was within the scope of Public Law 566; that existing watershed conditions warranted planning assistance; public opinion was in support of a watershed project; and sponsoring local organizations had the ability and willingness to fulfill future responsibilities during planning and construction of a watershed project.

The Texas State Soil and Water Conservation Board approved the application with a high priority for planning assistance.

The Three-Mile and Sulfur Draw watershed application for assistance under Public Law 566, as amended, was authorized for planning by the Administrator of the Soil Conservation Service on July 22, 1969. The State Conservationist of the Soil Conservation Service, in his written notification of initiation of work plan development, solicited information and comments from federal, state, and local agencies that might have an interest in the project. Contacts were made with several agencies and individuals during planning to obtain information and assistance during the planning process.

The Fish and Wildlife Service and the Texas Parks and Wildlife Department participated in a wildlife survey of the watershed and furnished a report of findings and anticipated project effects. The Archaeology Research Program of the Department of Anthropology, Southern Methodist University, carried out field surveys to locate and evaluate archeological resources that would be affected by construction of the floodwater retarding structures and floodwater diversion. As a result of the field surveys and studies, it was recommended, and sanctioned by the State Historic Preservation Officer, that salvage or nomination to the

National Register of Historic Places is not warranted for any of the archeological sites investigated.

The application for planning assistance for Three-Mile and Sulfur Draw watershed was made prior to implementation of Bureau of the Budget Circular A-95, however, the sponsors provided the El Paso Council of Governments with notification of intent to apply for assistance involving federal funds prior to the start of field planning operations.

Subsequent meetings were held by the sponsoring local organizations to inform the general public and involved landowners and to gain opinions and information from interested individuals. Landowners and operators were shown how their properties were involved in potential floodwater retarding structures with the use of maps and on-site observations.

Newspapers serving the watershed area published articles announcing public meetings and reported information and conclusions resulting from the meetings. In addition, individuals whose land was directly involved with potential floodwater retarding structures and the floodwater diversion were notified and invited on an individual basis to attend meetings.

A public information meeting was held on February 20, 1975, in the district courtroom of the Culberson County Courthouse, Van Horn, Texas. The purpose of the meeting was to provide the public current information concerning the status of project planning and impacts resulting from project installation, and provide affected or interested individuals and groups an opportunity to offer their opinions and expertise. Among those present were landowners whose land will be affected, officials of the city of Van Horn and Culberson County, members of the sponsoring local organizations, representatives of the local press, interested citizens, and Soil Conservation Service personnel. The location, physical features, and functions of planned structural measures were discussed. Responsibilities of the sponsoring local organizations were considered. Alternatives to the planned project and anticipated favorable and adverse impacts with completion of the project were presented. There was no controversy relative to the adverse impacts.

The following federal agencies were requested to review and submit comments and recommendations:

- U.S. Department of the Army
- U.S. Department of Commerce
- U.S. Department of Health, Education, and Welfare
- U.S. Department of the Interior
- Environmental Protection Agency
- Federal Power Commission
- U.S. Department of Transportation
- Advisory Council on Historic Preservation
- Office of Economic Opportunity

The following state and local agencies were requested to review and submit comments and recommendations:

Division of Planning Coordination (State Agency designated by Governor and State Clearinghouse)
West Texas Council of Governments (Regional Clearinghouse)

Discussion and Disposition of Each Comment on Draft Environmental Impact Statement

All of agencies requested to comment on the Draft Environmental Impact Statement submitted comments except the U.S. Department of Commerce, Federal Power Commission, and the Office of Economic Opportunity. In addition, the National Audubon Society submitted comments. The respondents comments and disposition of each are as follows:

U.S. Department of the Army

Comment: The Department stated that detailed overflow area maps, with and without the project in place would be desirable and useful for local government and populace to plan for future flood plain use.

Response: Detailed overflow area maps are valuable tools for planning in most flood prone areas. However, for this particular area, an overflow area map, other than a very general one, would be of limited use. Most of the watershed to the east and south of the Baylor, Beach, and Carrizo Mountains is subject to overland flow. The depth and extent of this flow is determined by location, extent, intensity, and duration of storm events in addition to topography. The unpredictability of these factors and their combined effects on overland flow in the area renders it impractical to attempt to develop a detailed overflow map for the purpose of future flood plain use.

Comment: The Department stated a display showing benefits, costs, and relative environmental impacts of alternatives would be helpful.

Response: Noted, the Soil Conservation Service has attempted to present the various alternatives in narrative form as clearly and objectively as possible. For this particular project, it is felt this approach is sufficient; therefore, no changes or additions have been made.

Comment: The Department commented that in order to comply with Section 122 of Public Law 91-611, a discussion of trends in population, agriculture, and industrial development should be in the ENVIRONMENTAL SETTING section of the Environmental

Impact Statement. The Environmental Impact Statement should also include OBERS related projections for population, agriculture, and industry.

Response: Public Law 91-611 criteria is not specifically applicable to projects planned under the auspices of Public Law 83-566, therefore, no changes have been made in this regard. It is Soil Conservation Service policy, as published in the "Federal Register, Volume 39, Number 107, Part III," Monday, June 3, 1974, to include OBERS projections only if they are appropriate and applicable to the project area. It is the opinion of the Soil Conservation Service that OBERS data presently available are not pertinent for the watershed and adjacent areas due to their relatively small size when compared to B.E.A. Region 145. However, combined population projections, for Culberson and Hudspeth Counties extracted from "Preliminary Population Projections for Texas Counties: 1970-1990." Population Research Center, the University of Texas at Austin and indicated by footnote, have been added to the Final Environmental Impact Statement and Work Plan.

United States Department of the Interior

Comment: The Department stated that outdoor recreation concerns were given adequate consideration in the Draft Work Plan and Draft Environmental Impact Statement.

Response: Noted.

Comment: The Department suggested that appropriate paragraphs in the Work Plan and Environmental Impact Statement be expanded to include species of plants which will be used to revegetate areas disturbed as a result of installation of structural measures, and that plants which provide food and cover for wildlife should be used.

Response: The Soil Conservation Service agrees that multi-use plants that are beneficial to wildlife in addition to controlling erosion should be used when feasible. However, after agronomists and other plant specialists made additional studies, references to establishment of vegetation on disturbed areas resulting from construction operations were deleted from the final documents. Based upon experience obtained from floodwater retarding structures that have been installed under similar conditions since 1960, and from professional expertise and knowledge gained from working in the Trans-Pecos area of Texas, the determination was made that it would be impractical to attempt establishment of vegetation on planned structures for soil erosion control.

In lieu of vegetation, it will be necessary to use rock riprap and gravel blankets. This is discussed in both final documents.

Comment: The Department stated that the Fish and Wildlife Service report was quoted on pages 16 and 35 of the Draft Work Plan and Draft Environmental Impact Statement respectively. However, in both documents the second sentence of the quoted report is omitted.

Response: The subject sentence was inadvertently omitted in the draft documents. It has been included in the Final Work Plan and Environmental Impact Statement.

Comment: The Department commented that on page A-16 of the Draft Work Plan, the dedication of 10,000 acres of range for bighorn sheep is cited as an irreversible or irretrievable commitment of resources. However, while this is expected to be an action of lasting duration, it is not necessarily irreversible as indicated.

Response: The listing of 10,000 acres for a bighorn sheep range as an irreversible and irretrievable commitment of resources has been deleted from the Abbreviated Environmental Quality Plan included in the three-part Addendum.

Comment: In reference to the three-part Addendum of the Draft Work Plan, the Department stated, "The sections entitled 'Environmental Quality Account' and 'Abbreviated Environmental Quality Plan' confuse environmental quality with economic development, regional development and social well-being components which should appear with their respective systems of account. On page A-11, the list of component needs for the environmental quality plan includes the following item: 2d. 'Prevent damage of residences and associated improvements, roads, and to sources of livelihood of human inhabitants by flooding.' The last paragraph on page A-12 includes 'irrigation land leveling, irrigation systems, and diversions' under the plan elements for environmental quality.

"According to the Principles and Standards for Planning Water and Related Land Resources (Federal Register, Vol. 38, No. 174, page 33), the environmental quality objective'...reflects society's concern and emphasis for the natural environment and its maintenance and enhancement as a source of present enjoyment and a heritage for future generations.' We recommend that the Environmental Plan contain only objectives concerned with the quality of the 'natural environment' and resources as stated by the Principles and Standards."

Response: An introduction has been added to the three-part Addendum which sets forth the purpose of the Addendum and also explains the formulation of the Abbreviated Environmental Quality Plan. No change has been made in the Abbreviated Environmental Quality Plan relative to the Department's comment. The plan was formulated in accordance with the Soil Conservation Service's interpretation of the Water Resource Council's guidelines, in which the Environmental Quality Plan can and should provide national economic development, regional development, and social well-being effects that are incidental and do not detract from the environmental objective.

The Environmental Quality Account of the selected plan as displayed in Part II of the Addendum has been revised to delete measure effects related to national economic development, regional development, and social well-being.

Comment: The Department stated it believes the Environmental Impact Statement would be easier to follow if each section were restricted to material that correlates with the heading. Paragraph one on page 10, for example, is a good example of the physical setting but doesn't seem to add to the discussion of the planned project.

Response: The narratives of the Work Plan and Final Environmental Impact Statement have been checked in consideration of the Department's comment. The paragraph as written describes the streamflow at the site location for Floodwater Retarding Structure No. 1. It is the opinion of the Soil Conservation Service that this paragraph does add to the discussion of the planned project. Streamflow conditions can dictate the use of special precautions to prevent contamination of water during construction of structural measures. Also, streamflow conditions can influence the design and cost of structural measures. This paragraph and a similar paragraph on page 11 of the Draft Environmental Impact Statement have been retained for the Final Work Plan and Final Environmental Impact Statement.

Comment: The Department commented there should be a discussion in the Planned Project section relating to the magnitude of flood discharges from the planned diversion and the potential erosion on the discharge area.

Response: More information has been added to appropriate sections of the Final Environmental Impact Statement relative to potential peak discharges from the diversion caused by a one percent chance storm and the possibility of erosion from the discharge.

Comment: The Department stated the effects of the project on the existing flood diversion structure north of Van Horn are not

adequately discussed. It is indicated on page 60 of the Draft Environmental Impact Statement that the existing flood diversion structure north of Van Horn is subject to failure in floods greater than the 25-year flood and that it is conceivable that floodwaters might be channeled into the urban area causing more damage than had there been no diversion structure. Floodwater Retarding Structure No. 2 when installed will reduce the magnitude of floods reaching the existing diversion north of Van Horn but will not eliminate the threat of floods that could result in failure of the structure. More discussion should be addressed to this in the Final Environmental Impact Statement.

Response: A discussion has been added to the Final Environmental Impact Statement and Work Plan in regard to the effects Floodwater Retarding Structure No. 2 will have on the functioning of the existing floodwater diversion north of Van Horn.

Comment: The Department commented in regard to the Draft Environmental Impact Statement, "The summary of environmental impacts may give the impression that flood prone areas to be protected comprise only about 1,465 acres (Summary, paragraph V.5), whereas it is stated later that flood protection will be provided to 13,200 acres of flood plain land (page 47, paragraph 5, line 1)."

Response: The "...1,465 acres (Summary, paragraph V.5)" should be 1,515 acres as indicated in the Draft Environmental Impact Statement. It should be noted that the 1,515 acres is the area flooded on an average annual basis, whereas a total of 13,200 acres are to be protected from flooding when the project is complete. No changes were made in either the Final Environmental Impact Statement or Work Plan.

Comment: The Department noted a discrepancy in the acreage proposed for land treatment in the Draft Environmental Impact Statement. It is given in the Summary as 26,360 acres and elsewhere in the document as 26,420 acres.

Response: The acreage as given in the Summary of the Draft Environmental Impact Statement is in error. The correct figure is 26,420 acres. The error has been corrected in the Final Environmental Impact Statement.

Comment: The Department stated that there is no indication the State Historic Preservation Officer was consulted in regard to the field survey and evaluation of archeological resources; a copy of his comments as to the effects of the project on resources listed on or in the process of nomination to the National Register of Historic Places should be included in the Final Environmental Impact Statement.

Response: Additional field surveys and studies have been accomplished in consultation with the State Historic Preservation Officer. His opinion in regard to the significance of known cultural resources and the project's effects are indicated in the Final Environmental Impact Statement and Work Plan. A copy of his letter is included in the Final Environmental Impact Statement, however, there are no properties in the watershed that are listed on or in the process of nomination to the National Register of Historic Places.

Comment: Archeological resources encountered in the project area should be described and evaluated for their "National Register" potential. If the resources meet applicable criteria, they should be nominated to the National Register of Historic Places and compliance with pertinent statutes documented.

Response: Additional investigations and studies have been accomplished on archeological resources to be affected by installation and functioning of the planned structural measures. The conclusion as a result of these investigations and studies is that nomination of these resources to the National Register of Historic Places is not warranted. This decision was made by the Archaeology Research Project, Southern Methodist University, and concurred in by the State Historic Preservation Officer. Appropriate discussion has been included in the Final Work Plan and Environmental Impact Statement.

Comment: The Final Environmental Impact Statement should include the procedures to be followed as required by Public Law 93-291 in the event cultural resources are encountered during construction operations.

Response: The procedures that will be followed in the event culture resources are encountered during construction operations have been included in the Final Work Plan and Environmental Impact Statement. The procedures enumerated are those deemed appropriate by the Soil Conservation Service, USDA, to comply with Section 106, PL 89-665 16USC 470(f), and Section 1 (3) Executive Order 11593.

Department of Health, Education, and Welfare

Comment: The Department stated that it could discern no adverse effects that might be of significance where its program responsibilities and standards pertain, provided appropriate guides are followed in concert with State, County, and local environmental laws and regulations. The Department has no objection to the authorization of the project insofar as its interests and responsibilities are concerned.

Response: Noted.

United States Coast Guard

Comment: The Department had no comments or any objection to the project.

Response: Noted.

Environmental Protection Agency

Comment: The Agency stated that in the absence of approved or proposed federal, state, or local land use plans, policies, and controls for the watershed and surrounding area, it recommends the Soil Conservation Service meet with local officials to discuss the feasibility of developing a coordinated land use plan which would help assure that any future development in the area would be in an environmentally acceptable manner.

Response: The Soil Conservation Service does not have legislative authority to initiate or participate in regulatory land use planning. It can, upon request, provide resource data to any unit of government for use in formulating a land use plan or regulations. All units of government, having legal authorities under applicable State law within the watershed, have been made aware of the resource data we can provide.

Comment: The Agency stated the Draft Environmental Impact Statement provided adequate information concerning the environmental effects of the project, and it has no objection to the project as proposed. Consequently, the Draft Environmental Impact Statement has been classified as LO-1.

Response: Noted.

Advisory Council on Historic Preservation

Comment: The Council stated it had determined that the Draft Environmental Impact Statement and Work Plan are apparently adequate in compliance with Section 106 of the National Historic Preservation Act of 1966.

Response: Noted.

Comment: The Council noted that installation of the project will have an adverse effect on archeological resources whose eligibility to the National Register of Historic Places has not been determined. The Council requested that the Soil Conservation Service properly evaluate the archeological significance of these resources and inform it of the findings so it could furnish comments on the effects of the project on the subject

resources. This action is necessary to accommodate the requirements of Executive Order 11593 and the Council's "Procedures for the Protection of Historic and Cultural Properties" which sets forth the course for compliance with E.O. 11593.

Response: Pursuant to the Council's request, the Soil Conservation Service contacted the Archaeology Research Program, Southern Methodist University to perform additional studies and evaluations of the affected sites to ascertain their eligibility for the nomination to the National Register of Historic Places. As a result of this reevaluation, which included comprehensive testing of these sites, none of the sites were considered to be worthy of nomination. On the basis of the reevaluation and testing, the Soil Conservation Service concludes that the installation of the planned project will not affect any archeological sites eligible for nomination to the National Register of Historic Places. The State Historic Preservation Officer has reviewed the entire case file relative to all cultural resources to be affected by the project and concurs with the conclusions reached by the Soil Conservation Service. A copy of the letter expressing the views of the State Historic Preservation Officer is included in Appendix C of the Final Environmental Impact Statement.

The Final Environmental Impact Statement has been revised to reflect the above facts.

Office of the Governor, Division of Planning Coordination

Comment: The Division of Planning Coordination stated that review participants submitted generally favorable comments on the Draft Work Plan and Draft Environmental Impact Statement. In addition, constructive suggestions were provided by review participants.

Response: Noted, comments submitted by the review participants and the responses to those comments are included in this document.

Comment: The Division of Planning Coordination stated that in developing plans for the proposed bighorn sheep refuge, it encourages close coordination with the Texas Parks and Wildlife Department.

Response: The development of a bighorn sheep refuge is an element of the Abbreviated Environmental Quality Plan in the three-part Addendum attached to the Work Plan. This element is not part of the Three Mile Sulfur Draw Watershed project plan. An introduction has been added to the three-part Addendum to clarify its function and explain its content.

Parks and Wildlife Department

Comment: The Department commented it is most interested in establishing free-ranging, self-sustaining populations of bighorn sheep in Texas, and work which has been done toward reestablishment of the species in Texas has been exclusively that of the Texas Parks and Wildlife Department. Reference was made to pages A12, A13, and A14 of the Draft Work Plan and to the creation and management of a 10,000 acre refuge for bighorn sheep which would be done jointly by local, state, and federal agencies. It was requested that this endeavor be described in greater detail as to the manner of acquisition of land, specific agencies involved, who will manage for the sheep, and the source of sheep to be used for stocking. The Department stated it has not been officially contacted relative to such activities.

Response: The establishment of a 10,000 acre refuge for bighorn sheep as presented in the Abbreviated Environmental Quality Plan of the three-part Addendum attached to the Draft Work Plan is not an element of the proposed project. It is, as indicated in the Addendum, an element of the Abbreviated Environmental Quality Plan. The three-part Addendum is attached to the Work Plan as required by the Water Resource Councils "phase-in" criteria of the Principles and Standards. The Soil Conservation Service has recognized that the purpose of the Addendum and its relationship to the proposed project plan were not explained adequately in the Draft Work Plan. Therefore, an introduction has been added to the three-part Addendum in the Final Work Plan which sets forth the purpose of the Addendum and also explains the formulation of the Abbreviated Environmental Quality Plan.

Inasmuch as the establishment of a bighorn sheep refuge is not a plan element of the proposed project, it has not been described in more detail, as requested by the Department, in the Final Work Plan.

Texas Water Development Board

Comment: The Board stated the project will not interfere in any way with measures proposed in the Texas Water Plan and it had no objections to offer to the plan of development as presented.

Response: Noted.

Texas Water Rights Commission

Comment: The Commission stated the Draft Work Plan and Draft Environmental Impact Statement conform reasonably to the major

analytic and administrative criteria of applicable sections of the Office of Management and Budget Circular No. A-95 (Revised), effective January 1, 1974; the National Environmental Policy Act of 1969; and the Water Resource Council's Principles and Standards for Planning Water and Related Land Resources.

Response: Noted.

Comment: The Addendum to the Draft Watershed Work Plan outlining the benefits and costs of the two floodwater retarding structures and a floodwater diversion of the Public Law 566 project serves to enhance the document. However, clarification is necessary as to whether the Soil Conservation Service intends to implement the entire \$3,600,000 Environmental Quality Plan as described by the Abbreviated Environmental Quality Plan in Part III of the Addendum. More specifically, are the non-Public Law 566 projects eligible for funding under the Rural Environmental Conservation Program?

Response: The purpose of the Addendum and its relationship to the project plan were not explained adequately in the Draft Work Plan. An introduction has been added to the three-part Addendum in the Final Work Plan which sets forth the purpose of the Addendum, and explains the formulation of the Abbreviated Environmental Quality Plan. The Soil Conservation Service does not intend to implement the entire \$3,600,000 as presented Abbreviated Environmental Quality Plan. Improvement of county and private roads and establishment of a bighorn sheep refuge are not elements of the proposed project plan, and are not eligible for cost sharing under the Agricultural Conservation Program (formerly Rural Environmental Conservation Program).

Texas Forest Service

Comment: The Service stated that little or no mention is made in the Draft Work Plan in regard to the use and appropriateness of planted windbreaks throughout the watershed. Windbreaks are especially appropriate for the city of Van Horn as greenbelts, in parks, and other public and privately owned recreational areas for improving the environment as well as along major highways for reducing noise pollution. Generous plantings of windbreaks around ranch headquarters would enhance the quality of life for the operators and other inhabitants. Windbreaks would perhaps contribute as much or even more to the social well-being of the area as the "in site" watershed project measures.

Response: The Soil Conservation Service can not generally recommend planting trees for windbreaks in this arid area due to the

lack of suitable species proven to be capable of surviving on a long-term basis with a minimal amount of care. However, the Soil Conservation Service can and will work with individuals or groups interested in planting and establishing trees on an experimental basis.

Texas Department of Agriculture

Comment: The Department stated the Draft Work Plan and Draft Environmental Impact Statement are very well written and appear to be comprehensive. However, they need to be carefully edited to correct inconsistencies. As an example, the 1970 population of Van Horn is given on pages 15 and 16 of the Draft Work Plan, but they differ by about 20 percent.

Overall, the planned project is apparently sound and in these times of food shortages, efforts such as this to restore agricultural lands have our support.

Response: The Final Environmental Impact Statement and Work Plan have been edited for inconsistencies and corrections made.

Texas Industrial Commission

Comment: The Commission stated there seem to be only positive environmental effects to be generated by installation of the project. However, it appears that more populous crop-growing regions of the state would make greater gains from the expenditure of \$3,600,000.

Response: The \$3,600,000 referred to is the estimated cost of the Abbreviated Environmental Quality Plan in the three-part Addendum attached to the Draft Work Plan. This is not the anticipated cost of the planned project. The current estimated cost of the planned project is \$1,293,090, which includes private and federal funds. An introduction has been added to the three-part Addendum, which sets forth the purpose of the Addendum and also explains the formulation of the Abbreviated Environmental Quality Plan. The plan was formulated in accordance with the Soil Conservation Service's interpretation of the Water Resource Council's "phase-in" criteria for the Principles and Standards for planning water resource projects.

Texas State Soil and Water Conservation Board

Comment: The Board stated that its involvement in the project, from assisting in gaining planning authorization to the present status, leads to its full concurrence in the Draft Work Plan and in its opinion the Draft Environmental Statement adequately discloses the project's impacts.

Response: Noted.

Texas Water Quality Board

Comment: The Board stated that after review of the Draft Environmental Impact Statement and Work Plan it concludes that water quality conditions and matters have been addressed adequately. The Board's letter of comment also stated, "We have noted the inclusion of the Abbreviated Environmental Quality Plan in the Addendum to the work plan that summarizes the environmental effects that would result from installation of the proposed work plan."

Response: In regard to the above quotation concerned with the Environmental Quality Plan in the Addendum, the Environmental Quality Plan is not a summarization of environmental effects as a result of installation and completion of the proposed project. Rather, it is an alternative to the proposed project with special emphasis on environmental quality as effected by certain natural and cultural resources and ecological systems. The introduction for the Addendum has been revised to explain the purpose and intent of the Environmental Quality Plan.

Texas Highway Department

Comment: The Department stated that apparently the project will have no adverse effect on existing highways or planned highway improvements.

Response: Noted.

The University of Texas at Austin Bureau of Economic Geology

Comment: The Bureau had no negative comments on the Draft Work Plan and Draft Environmental Impact Statement.

Response: Noted.

Texas Air Control Board

Comment: The Board stated it had no additional comments to make concerning the project other than those in its letter of January 16, 1975.

Response: The comments in the January 16, 1975 letter from the Board stated that any open burning must be in accordance with Regulation I, Rule 101.25 of the Texas Air Control Board, and dust resulting from construction operations should be controlled by sprinkling with water or by application of chemicals.

These comments were offered as information and inputs to be used in the Draft Work Plan and Draft Environmental Impact Statement. The comments were given full consideration in developing the draft documents which have been reviewed by the Board.

West Texas Council of Governments

Comment: The WTCOG stated that it had reviewed and favorably endorsed the proposed draft of the Work Plan and there is apparently no substantial changes needed in the Draft Work Plan. Therefore, it restated its previous endorsement of the project.

The WTCOG did suggest, however, that the Final Work Plan provide an explanation relating to the purpose of the Environmental Quality Plan in the Addendum. The initial understanding led to the mistaken conclusion that the Work Plan had been revised to include the Environmental Quality Plan.

Response: The introduction to the Addendum has been revised to explain the Addendum's purpose and how it relates to the Work Plan.

National Audubon Society

Comment: The effects of the project as listed on pages 55 through 58 of the Draft Environmental Impact Statement are apparently weighted toward favorable impacts by including questionable items and redundancy under the FAVORABLE ENVIRONMENTAL EFFECTS section while several adverse effects have been omitted under the ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED section. In the favorable effects section, items 2 through 9 contain some redundancy; items 5 and 9 repeat items 2, 3, and 4; and item 7 repeats item 6 which gives the impression that the project offers more beneficial effects than is really the case.

Response: We do not believe there is redundancy in the inclusion of the referenced items. As written they present separate and distinct impacts. While each of these impacts have their origin in a reduction of erosion or flooding, the ultimate impacts are distinctly different as to their location and environmental problems affected.

Comment: The Society stated the extent to which floodwater retarding structures will improve the nesting habitat of birds is doubtful. Species presently inhabiting the area are presumably well adapted to seasonal flooding, which does not occur during the nesting season for most species. It is clear from the data supplied, only the structures will cause a change in nesting habitat of an unknown sort, and upset the existing

natural balance to a certain extent. This item (10d, page 56, Draft Environmental Impact Statement) should properly be listed as an adverse effect rather than a favorable effect.

Response: We do not agree that the referenced item should be listed as an adverse effect. Soil Conservation Service biologists, after consultation with various Texas Parks and Wildlife Department biologists, are in agreement that a reduction in severity and frequency of flooding will in fact be beneficial to certain ground-nesting birds and burrowing mammals. Normally, the major rains can be expected to occur within the nesting season of the scaled quail, ground-nesting mourning dove, and several other species of birds indigenous to the watershed and surrounding area. No changes have been made in the Final Environmental Impact Statement and Work Plan.

Comment: The Society stated that items 12, 13, 14, and 15 as shown under the FAVORABLE ENVIRONMENTAL EFFECTS section of the Draft Environmental Impact Statement pertain to social and economic benefits and should not be included in environmental considerations. If included, however, the local economic benefits, due to infusion of federal money for construction and maintenance of the project, should be offset by reference to the adverse economic effects on the rest of the country because of increased tax burden and inflation.

Response: We believe the referenced items were properly displayed in the Draft Environmental Impact Statement. These items enumerate favorable effects the completed project will have on man's environment, therefore, no changes have been made.

In regard to comparing local economic benefits with the expenditure of federal funds, this was done in the National Economic Development Account and the Regional Development Account in the Addendum to the Draft Work Plan. Also, Table 6 in the Draft Work Plan and Appendix A in the Draft Environmental Impact Statement display average annual benefits, average annual costs, and the resulting benefit-cost ratios. No changes have been made in the Final Environmental Impact Statement and Work Plan.

Comment: An environmental effect not considered, but which might be added to the FAVORABLE ENVIRONMENTAL EFFECTS section, is that full implementation of the proposed project will increase the ecological diversity of the project watershed by providing ephemeral wetland habitat which does not presently exist, and presumably permitting the colonization of the watershed by species which are not now found in the area.

Response: The creation of wetland habitat has been included as a favorable environmental effect in the Final Environmental Impact Statement and Work Plan.

Comment: The items listed under ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED on page 57 of the Draft Environmental Impact Statement pertain for the most part to the temporary effects of the construction of the floodwater retarding structures, and not to the long-term effects on the ecology of the watershed.

Response: We agree. It is the Soil Conservation Service's policy to include short-term and long-term effects, if any, in an effort to fully disclose and evaluate project impacts.

Comment: The Society stated that probably the most damaging aspect of the proposed floodwater retarding structures is the effects they will have on the ground water hydrology of the Van Horn area. An analysis of these effects is not in the Draft Environmental Impact Statement. By reducing the velocity and spreading of storm runoff, in all likelihood ground water recharge will be reduced and surface evapotranspiration increased. This will produce an adverse effect on the quality and quantity of water available to irrigators, probably within the 100-year amortization period of the project. The three-paragraph discussion of ground water on page 25 of the Draft Environmental Impact Statement is vague at best. However, the discussion does state that recharge occurs during the summer flooding or ephemeral water courses, which the project is designed to stop. The one-sentence description, on page 23 of the Draft Environmental Impact Statement, of the surface deposits presumably involved in aquifer recharge is inadequate. A thorough discussion of local characteristics of ground water recharge is recommended which should include stratigraphic data from available well logs, estimates of porosity, permeability, recharge capability of alluvial sediment, estimates of velocity of flow in the aquifer, and estimates of the reduction of available recharge area as a result of project implementation. Also, estimates should be provided of the anticipated increase of evapotranspiration from the greater density of vegetation in and downstream from the floodwater retarding structures.

Response: The Soil Conservation Service does not agree that the proposed floodwater retarding structures will result in significant impacts, and in particular damaging impacts, on the ground water hydrology in the Van Horn area, therefore, no changes or additions have been made as suggested by the Society in the Final Environmental Impact Statement and Work Plan. However, the Geological Survey, United States Department of the Interior, and the Texas Water Development Board were each requested to review the Draft Environmental Impact Statement and Work Plan for the specific purpose of anticipating any impacts on ground water hydrology in the Van Horn area as a result of project

implementation and to furnish any of the referenced data recommended for inclusion in the documents. The following quotation is extracted from the Geological Survey's letter answering the SCS request.

"The Geological Survey agrees that the proposed floodwater retarding structures would not have a significant adverse effect on natural recharge to the ground water reservoir in the Van Horn area. In the first place, natural recharge to the aquifer is small relative to the withdrawal of water for irrigation; secondly, the amount of recharge contributed by these two drainageways represents only a small part of the total recharge to the basin; and thirdly, the irrigation community depends upon the water that is in storage and not on the recharge.

"Under some conditions, particularly when storm runoff is large, the structures could actually increase the natural recharge by reducing the velocity of the storm runoff, which would result in less water reaching the lower areas where ponding and evaporation could occur. The 1966 flooding, which was estimated to have a recurrence interval of about 25 years, reportedly caused some ponding in the lower areas of Wild Horse Draw, and a part of this ponded water was lost to evaporation. On the other hand, the structures could cause some reduction in recharge by retaining that part of the runoff in the sediment pool below the principal spillway as much as 200 acre-feet in the early life of the structure. However, as the pool fills with sediment, the volume of water lost to evaporation would decrease.

"Additional studies relative to the local characteristics of ground water recharge, including porosity and permeability of the sediment and estimates of velocity and direction of flow would be prohibitive in terms of cost and time. Furthermore, the data collected probably would not materially improve on our present concept of the hydrologic system, which is based on the results of our recent studies in the Van Horn area."

The Texas Water Development Board, in addition to suggesting the Soil Conservation Service contact the Geological Survey for information, submitted estimates on part of the data requested by the Society. However, the Board emphasized its estimates were based on "...very limited data from our files," and partially on the Texas Water Development Board, Bulletin 6502 Reconnaissance Investigation of the Ground-Water Resources

of the Rio Grande Basin, Texas, published in July 1965 and Report 114 Records of Water Levels and Chemical Analyses from Selected Wells in Parts of the Trans-Pecos Region, Texas, 1965-68. Due to the in part conjectural nature of these data, they were not included in the Final Environmental Impact Statement and Work Plan.

Comment: The depth, velocity, and duration of surface flow in about 12 miles of natural drainage will be severely altered. These are the only large drainages in the watersheds and they and their associated riparian habitats are a unique part of the project environment.

Only a superficial analysis is given, page 19 of the Draft Environmental Impact Statement, relative to this aspect of the surface hydrology and its influence on the ecology of the watershed. There is no data on the acreage of vegetation presently subjected to flooding with runoff from Three-Mile Draw and Sulfur Draw outside the farming area, or the flora and fauna of this particular environment, or to what extent the flora and fauna are different from adjacent areas not subjected to flooding. Also, no estimates are given of the probable changes in vegetation, wildlife, and specific habitat due to the cessation of seasonal flooding, other than projections of increased vegetation and improved habitat for a vaguely defined group of ground-nesting birds and other lowland game species.

Response: Additional information has been added to the Final Environmental Impact Statement and Work Plan pertaining to the structural measure's anticipated effects on vegetation and other relative impacts.

LIST OF APPENDIXES

Appendix A - Comparison of Benefits and Costs for Structural Measures

Appendix B - Project Map

Appendix C - Letters of Comment Received on the Draft Environmental Impact Statement

APPROVED BY


George C. Marks, State Conservationist

DATE April 26, 1976

COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Three-Mile and Sulfur Draw Watershed, Texas

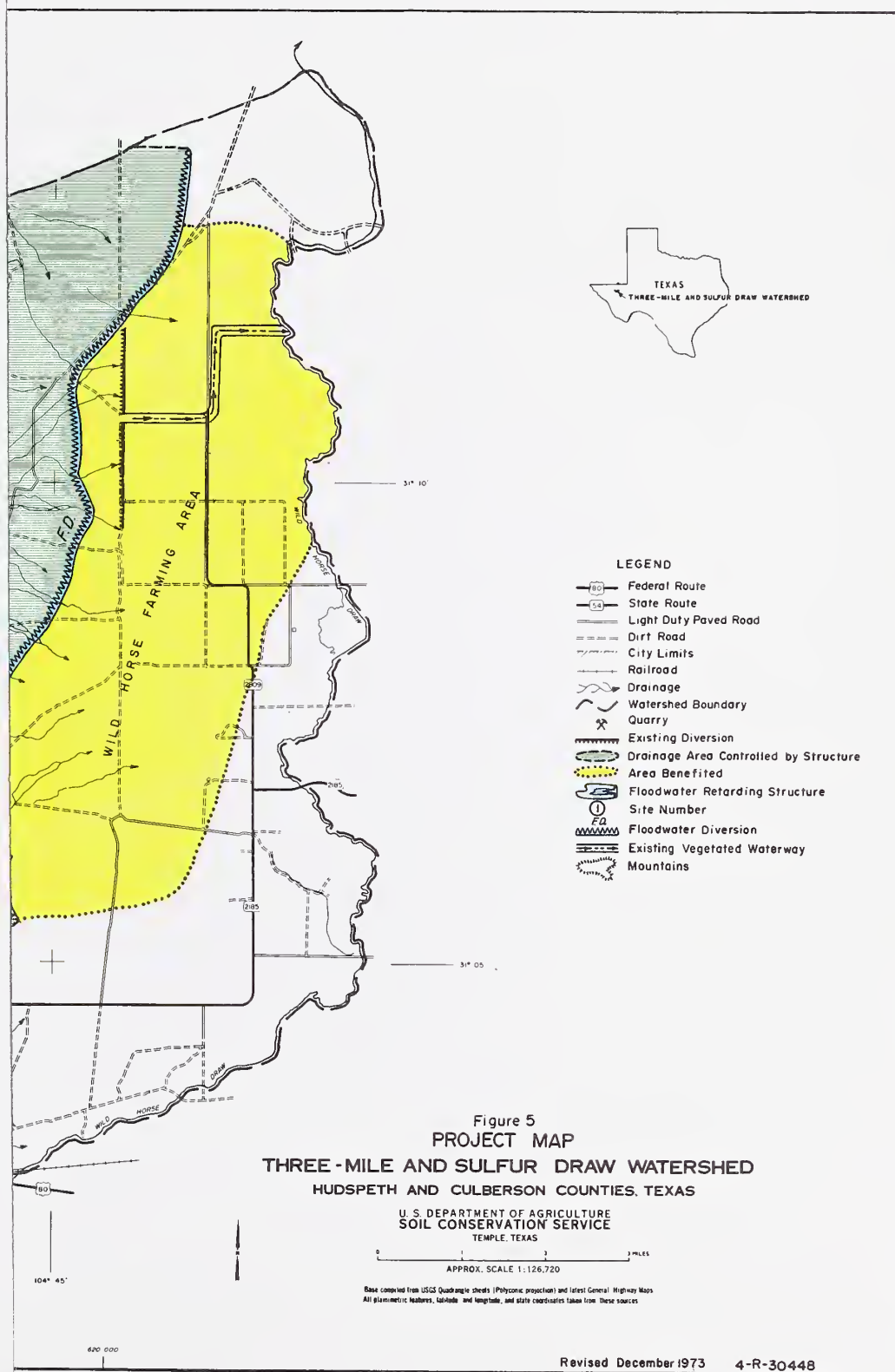
(Dollars)

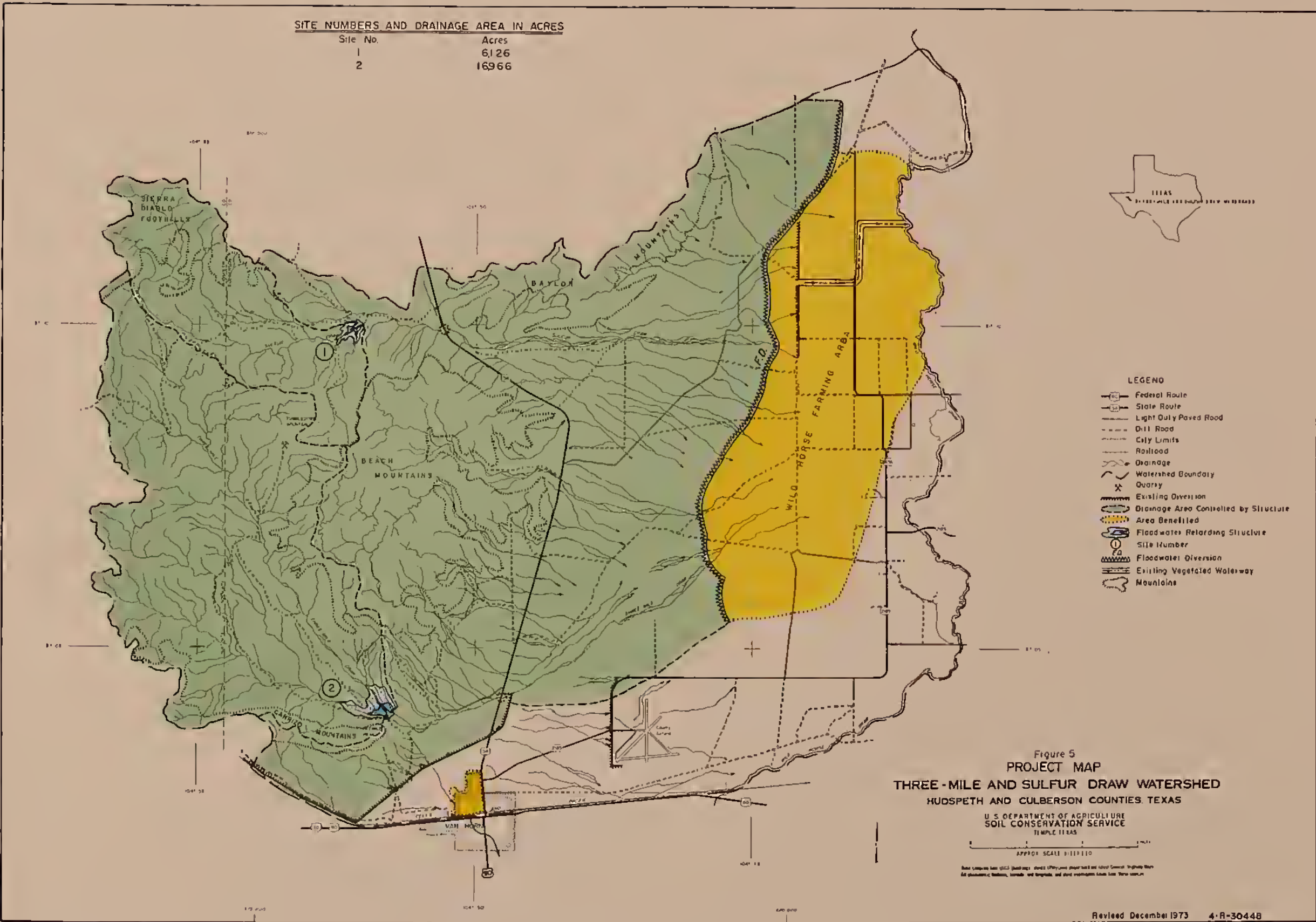
| Evaluation Unit | : AVERAGE ANNUAL | | | : Average | |
|---|------------------|------------|---------|-----------|------------|
| | : BENEFITS 1/ | | | : Annual | : Benefit- |
| | : Damage : | : | : Cost | : Cost | |
| | :Reduction: | Secondary: | Total : | 2/ | : Ratio |
| Floodwater Retarding Structures Numbers 1 and 2 and Floodwater Diversion | 140,720 | 33,230 | 173,950 | 62,710 | 2.8:1.0 |
| Project Administration | | | | 8,020 | |
| GRAND TOTAL | 140,720 3/ | 33,230 | 173,950 | 70,730 | 2.5:1.0 |

1/ Price Base: Agricultural benefits current normalized prices, October 1974; other benefits 1975 prices.

2/ Installation: 1975 prices amortized for 100-years at 6.125 percent interest; O&M - 1975 prices.

3/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of \$8,240 annually.





LETTERS OF COMMENTS



DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310

Honorable Robert W. Long
Assistant Secretary of Agriculture
Washington, D. C. 20250

Dear Mr. Long:

In compliance with the provisions of Section 5 of Public Law 566, 83d Congress, the State Conservationist, on behalf of the Administrator of the Soil Conservation Service, by letter dated 14 April 1975, requested the views of the Secretary of the Army on the Watershed Work Plan and the Draft Environmental Impact Statement for Three-Mile and Sulfur Draw, Culberson and Hudspeth Counties, Texas.

We have reviewed the work plan and foresee no conflicts with any projects or current proposals of this Department. The draft environmental statement is considered to be generally satisfactory. Our specific comments on the reports are inclosed.

Sincerely,

A handwritten signature in cursive script, reading "Charles R. Ford".

Charles R. Ford
Deputy Assistant Secretary of the Army
(Civil Works)

1 Incl (dupl)
As stated

Three-Mile and Sulfur Draw
Culberson and Hudspeth Counties, Texas

Comments on Watershed Work Plan
and Draft EIS

1. Detailed overflow area maps with and without the project in place would be desirable and also useful for the local government and populace so they can better plan for the future in the flood plain.
2. A display that would show benefits, cost and relative environmental impacts of alternative features would also be helpful.
3. To comply with Section 122 of PL 91-611, a discussion of trends of population, agriculture, and industrial development should be included in the environmental setting portion of the draft EIS. The statement should also include OBERS related projections for population, agriculture, and industry.



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

PEP ER-75/405

JUN 23 1975

Dear Mr. Thomas:

Thank you for your letter of April 14, 1975, requesting our review and comments on the draft environmental statement and work plan for the Three-Mile and Sulphur Draw Watershed, Culberson and Hudspeth Counties, Texas.

Our comments on the work plan and draft environmental statement will be presented according to subject or format of the documents.

General

Outdoor recreation concerns have been given adequate consideration in the draft statement and work plan.

It is suggested that certain paragraphs in the work plan (page 40, last paragraph; page 50, fourth full paragraph) and draft environmental statement (page 13, fourth paragraph; page 52, first paragraph) be expanded to indicate the species of plants that will be used in revegetation. Plants which provide both food and cover for wildlife in the project area should be used.

The Fish and Wildlife Service report was quoted in the same way on page 16 of the work plan and page 35 of the draft environmental statement. In both places the second sentence was omitted without explaining the omission. For your information the sentence reads: "Ranchers are reluctant to allow any public access, but some properties are leased for deer hunting."

Work Plan

The dedication of 10,000 acres as a range for bighorn sheep is cited as an "irreversible or irretrievable commitment of resources" (page A-16). While this is expected to be an action of lasting duration, it is not necessarily irreversible as indicated here.



The sections entitled "Environmental Quality Account" and "Abbreviated Environmental Quality Plan" confuse environmental quality with economic development, regional development and social well-being components which should appear with their respective systems of account. On page A-11, the list of component needs for the environmental quality plan includes the following item: 2d. "Prevent damage of residences and associated improvements, roads, and to sources of livelihood of human inhabitants by flooding." The last paragraph on page A-12 includes "irrigation land leveling, irrigation systems, and diversions" under the plan elements for environmental quality.

According to the Principles and Standards for Planning Water and Related Land Resources (Federal Register, Vol. 38, No. 174, page 33), the environmental quality objective ". . . reflects society's concern and emphasis for the natural environment and its maintenance and enhancement as a source of present enjoyment and a heritage for future generations." We recommend that the Environmental Plan contain only objectives concerned with the quality of the "natural environment" and resources as stated by the Principles and Standards.

Environmental Statement

We believe the environmental statement would be easier to follow if each section were restricted to material that correlates with the heading. For example, on page 10, paragraph 1 is a good description of the physical setting but does not seem to add to a discussion of the planned project.

Planned Project

The proposed 55,000-foot diversion channel would not discharge directly into an established stream channel, but rather onto a broad flat area two miles from Wild Horse Draw (page 13). The potential magnitude of flood discharges from this diversion and the potential erosion in the discharge area should be discussed.

The effects of the proposed project on an existing flood diversion structure around the town of Van Horn are not adequately discussed, although credit is taken for reducing flood damages in Van Horn. It is indicated (page 60) that the existing flood diversion at Van Horn is subject to failure in floods greater than a 25-year flood and that it is then conceivable that flood waters might be channelled into the

urban area causing greater damage than had there been no diversion structure. This appears to be a reasonable evaluation. The proposed flood-water retarding structure on Three Mile Draw upstream from Van Horn would reduce the magnitude of floods reaching the Van Horn diversion structure but would not eliminate the threat of floods that could lead to failure of the structure. This should be discussed further in the final statement.

The summary of environmental impacts may give the impression that flood-prone areas to be protected comprise only about 1,465 acres (Summary, paragraph V.5), whereas it is stated later that "flood protection will be provided to 13,200 acres of flood plain land" (page 47, paragraph 5, line 1). A minor discrepancy appears in the acreage proposed for land treatment during the five-year installation period, given as 26,360 acres in the Summary (paragraph IV), but as 26,420 acres elsewhere (for example, tabulation on page 3).

Historic and Archeological Sites

Although it is stated that a field survey and evaluation of archeological resources has been carried out, there is no indication that the State Historic Preservation Officer was consulted. A copy of his comments regarding the effect of the project upon properties listed on or in the process of nomination to the National Register of Historic Places should be included in the final environmental statement.

Any archeological resources encountered in the project area should be described and evaluated for their National Register potential. If they meet the criteria outlined in Title 36, CFR 800.10, they should be nominated to the National Register of Historic Places and compliance with Title 36, CFR 800.4 should be documented.

The final statement should also acknowledge the procedures to be followed under P.L. 93-291 (Reservoir Salvage Act Amendments) should cultural resources be encountered during construction.

We appreciate the opportunity to review these documents and hope these comments will be useful to you in the preparation of the final environmental statement.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Stanley B. Loveless". The signature is written in a cursive style with a large, prominent initial "S".

Deputy Assistant

Secretary of the Interior

Mr. Edward E. Thomas
State Conservationist
Soil Conservation Service
Department of Agriculture
P. O. Box 648
Temple, Texas 76501



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

REGIONAL OFFICE

1114 COMMERCE STREET
DALLAS, TEXAS 75202

May 5, 1975

OFFICE OF
THE REGIONAL DIRECTOR

Our Reference: EI# 1275-530

Mr. Edward E. Thomas
State Conservationist
Soil Conservation Service
Department of Agriculture
P. O. Box 648
Temple, Texas 76501

RE: Three-Mile and Sulfur Draw
Watershed, Texas

Dear Mr. Thomas:

Pursuant to your request, we have reviewed the Environmental Impact Statement for the above project proposal in accordance with Section 102(2) (c) of P. L. 91-190, and the Council on Environmental Quality Guidelines of April 23, 1971.

Environmental health program responsibilities and standards of the Department of Health, Education, and Welfare include those vested with the United States Public Health Service and the Facilities Engineering and Construction Agency. The U.S. Public Health Service has those programs of the Federal Food and Drug Administration, which include the National Institute of Occupational Safety and Health and the Bureau of Community Environmental Management (housing, injury control, recreational health and insect and rodent control).

Accordingly, our review of the Draft Environmental Statement for the project discerns no adverse effects that might be of significance where our program responsibilities and standards pertain, provided that appropriate guides are followed in concert with State, County, and local environmental laws and regulations.

We therefore have no objection to the authorization of this project insofar as our interests and responsibilities are concerned.

Very truly yours,

William F. Crawford
Environmental Impact Coordinator

cc: Warren Muir
Charles Custard



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-WS/73)
400 SEVENTH STREET SW.
WASHINGTON, D.C. 20590
PHONE: (202) 426-2262

10 JUN 1975

Mr. Edward E. Thomas
State Conservationist
Soil Conservation Service
P. O. Box 648
Temple, Texas 76501

Dear Mr. Thomas:

This is in response to your letter of 14 April 1975 addressed to Commandant, Coast Guard concerning a draft environmental impact statement for the Three-Mile and Sulfur Draw Watershed, Culberson County, Texas.

The Department of Transportation has reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

The opportunity to review this draft statement is appreciated.

Sincerely,

W. R. RIEDEL

Acting Deputy Chief, Office of Marine
Environment and Systems

By direction of the Commandant

ENVIRONMENTAL PROTECTION AGENCY

REGION VI

1600 PATTERSON, SUITE 1100

DALLAS, TEXAS 75201

June 13, 1975

OFFICE OF THE
REGIONAL ADMINISTRATOR

Edward E. Thomas
State Conservationist
United States Department
of Agriculture
Soil Conservation Service
P.O. Box 648
Temple, Texas 76501

Dear Mr. Thomas:

We have reviewed the Draft Environmental Impact Statement for Three-Mile and Sulfur Draw Watershed Project, Culberson and Hudspeth Counties, Texas. The proposed plan calls for the application of land treatment measures on about 26,360 acres and construction of two single-purpose floodwater retarding structures as well as 55,000 feet of floodwater diversion, to be constructed during a five-year installation period.

The statement discusses many of the environmental impacts which may be associated with project implementation; however, we offer the following for your consideration in developing the Final Environmental Impact Statement:

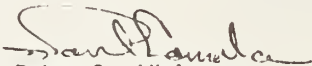
The statement indicates that at the present time "There are no approved or proposed federal, state, or local land use plans, policies, and controls pertaining to the watershed or surrounding area." We would recommend that the Soil Conservation Service consider meeting with local officials to discuss the feasibility of developing a coordinated land use plan which would help to assure that future development of the surrounding area occurs in an environmentally acceptable manner.

Your Draft Environmental Impact Statement has been classified LO-1. Generally, we have no objection to the project as proposed in the Draft Environmental Impact Statement. The Statement provided adequate information concerning the environmental impacts of the project. The classification and the date of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions, under Section 309 of the Clean Air Act.

Definitions of the categories are provided on the attachment. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and on the adequacy of the impact statement at the draft stage, whenever possible.

We appreciate the opportunity to review the Draft Environmental Impact Statement and we will be happy to discuss our comments with you. Please send us two copies of the Final Environmental Impact Statement at the same time it is sent to the Council on Environmental Quality.

Sincerely yours,


for John C. White
Acting Regional Administrator

Enclosure

ENVIRONMENTAL IMPACT OF THE ACTION

IO - Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER - Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to re-assess these aspects.

EU - Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

ADEQUACY OF THE IMPACT STATEMENT

Category 1 - Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2 - Insufficient Information

EPA believes the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3 - Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement. If a draft statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

Advisory Council
On Historic Preservation

MAY 2 1975

1522 K Street N.W. Suite 430
Washington D.C. 20005

Mr. Edward E. Thomas
State Conservationist
Soil Conservation Service
U. S. Department of Agriculture
P. O. Box 648
Temple, Texas 76501

Dear Mr. Thomas:

This is in response to your request of April 14, 1975 for comments on the draft environmental statement (DES) and watershed work plan (WWP) for the Three-Mile and Sulfur Draw Watershed, Culberson and Hudspeth counties, Texas. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council has determined that the DES and WWP appear adequate concerning compliance with Section 106 of the National Historic Preservation Act of 1966. However, with respect to compliance with the provisions of Executive Order 11593, "Protection and Enhancement of the Cultural Environment" of May 13, 1971, the Council notes that the proposed undertaking will result in an adverse effect to archeological resources whose eligibility for inclusion in the National Register of Historic Places has not yet been determined.

Section 800.4(a) of the Council's "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800) which sets forth the steps for compliance with Section 106 and the Executive Order 11593, specifies the method of evaluating the archeological significance of such properties. If this evaluation results in a determination by the Secretary of the Interior that the property is eligible for inclusion in the National Register, then the Soil Conservation Service (SCS) must afford the Council an opportunity to comment in accordance with Section 800.4(e) of the procedures.

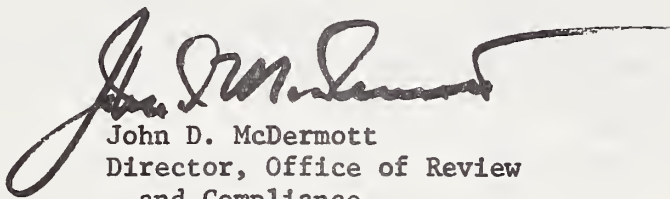
The Council requests that SCS undertake the evaluation of the archeological significance of these archeological resources and inform us of the findings.

Until the requirements of the Executive Order 11593 and the Procedures are met, the Council considers the DES and WWP to be incomplete in their treatment of historical, architectural and archeological resources. To remedy this deficiency, the Council will provide substantiative comments on the undertakings effect on the above referenced properties through the compliance process detailed in the procedures. Please contact Michael H. Bureman at P. O. Box 25085, Denver, Colorado 80225, telephone number (303) 234-4946, of the Council's

staff to assist you in completing this process as expeditiously as possible.

Your cooperation in this matter is appreciated.

Sincerely yours,

A handwritten signature in black ink, appearing to read "John D. McDermott", with a long, sweeping horizontal flourish extending to the right.

John D. McDermott
Director, Office of Review
and Compliance



DOLPH BRISCOE
GOVERNOR

OFFICE OF THE GOVERNOR
DIVISION OF PLANNING COORDINATION

JAMES M.
DIRECTOR

August 12, 1975

Mr. Edward E. Thomas
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
P. O. Box 648
Temple, Texas 76501

Dear Mr. Thomas:

The draft environmental impact statement (DEIS) and the watershed work plan (WWP) for Three-Mile and Sulfur Draw Watershed, Texas have been reviewed by the Governor's Division of Planning Coordination and by interested State agencies.

Review participants submitted generally favorable comments on the cited DEIS and WWP and, in addition, provided the following constructive suggestions:

1. The Texas Parks and Wildlife Department (TP&WD) noted various references in the WWP to the creation and management of a refuge for bighorn sheep. They expressed interest in the proposal because all past work to reestablish the bighorns in Texas has been done by the TP&WD. The TP&WD stated that they are very interested in establishing a free ranging, self sustaining population of bighorn sheep in Texas. Therefore, they requested that the proposal be described in greater detail to outline the manner of land acquisition, the specific agencies involved, the method of management and the source of sheep for stocking the project.
2. The Texas Water Development Board (TWDB) stated that this project will not interfere with measures proposed in the Texas Water Plan. The TWDB noted the protective measures above the City of Van Horn and the Wild Horse Farming Area which they agreed should afford a reasonable degree of protection.
3. The Texas Water Rights Commission stated that there is need to clarify the eligibility of non-PL566 projects for funding under the Rural Environmental Conservation Program.
4. The Texas Forest Service noted that the WWP included little or no mention of planted windbreakers and made several suggestions for their use.

Mr. Edward E. Thomas

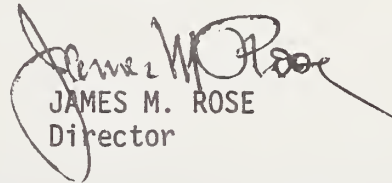
Page 2

5. The Texas Department of Agriculture (TDA) expressed support for the measures for restoring agricultural lands and noted that the documents are comprehensive and well written. The TDA also made suggestions for the correction of some inconsistencies in the cited documents.
6. The Texas Industrial Commission suggested that the proposed expenditure of \$3,600,000 could provide greater gain through investment in more populous, crop growing regions of the state.

The Division of Planning Coordination encourages close coordination with the TP&WD in developing plans for the proposed bighorn sheep refuge.

The comments of the review participants are enclosed to assist in your planning effort. If we can be of further assistance, please let us know.

Sincerely,



JAMES M. ROSE
Director

JMR/tw
Enclosures

cc: Mr. Clayton T. Garrison, Texas Parks and Wildlife Department
Mr. Harry P. Burleigh, Texas Water Development Board
Mr. Joe D. Carter, Texas Water Rights Commission
Mr. Mason C. Cloud, Texas Forest Service
Mr. Edmund L. Nichols, Texas Department of Agriculture
Mr. James H. Harwell, Texas Industrial Commission
Mr. Harvey Davis, Texas State Soil and Water Conservation Board
Mr. Hugh C. Yantis, Jr., Texas Water Quality Board
Mr. B. L. DeBerry, State Department of Highways and Public Transportation
Dr. C. G. Groat, Bureau of Economic Geology
Mr. Charles R. Barden, Texas Air Control Board

COMMENTS
Natural Resource Section
Three-Mile and Sulphur Draw Watershed Project

The Draft Environmental Impact Statement and Work Plan for watershed protection and flood prevention in Three-Mile and Sulphur Draw have been reviewed by this section. A thorough analysis for this project has been completed and each document is clear and complete. No adverse comments are submitted.

Joe B. Harris

JOE B. HARRIS

May 13, 1975

John M. Gosdin

JOHN M. GOSDIN

May 13, 1975

TEXAS
PARKS AND WILDLIFE DEPARTMENT



COMMISSIONERS

PEARCE JOHNSON
Chairman, Austin

JOE K. FULTON
Vice-Chairman, Lubbock

JACK R. STONE
Wells

COMMISSIONERS

BOB BURLESON
Temple

JOHN M. GREEN
Beaumont

LOUIS H. STUMBERG
San Antonio

CLAYTON T. GARRISON
EXECUTIVE DIRECTOR

JOHN H. REAGAN BUILDING
AUSTIN, TEXAS 78701

- June 16, 1975

Mr. Wayne N. Brown
Division of Planning Coordination
Office of the Governor
P. O. Box 12428, Capitol Station
Austin, Texas 78711

Dear Mr. Brown:

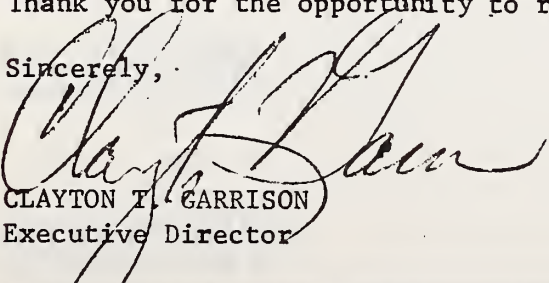
This Department has reviewed the work plan and draft environmental statement for Three-mile and Sulfur Draw Watershed Projects, Culberson and Hudspeth Counties, Texas.

Reference is made on pages A12, A13, and A14 of the work plan, to the creation and management of a 10,000 acre refuge for bighorn sheep, to be done jointly by "local, state and federal agencies." This action would involve the acquisition of a large amount of private land. It is requested that the activity mentioned in the subject document be described in greater detail as to the manner of acquisition of the land, specific agencies involved, who will manage for the sheep, and the source for sheep to be used for stocking. This Department has not been officially contacted relative to such activities.

The Parks and Wildlife Department is very interested in establishing free-ranging, self-sustaining populations of bighorn sheep in Texas. The limited number of sheep which the Department has propagated for restocking is the only source of broodstock available in Texas. Work which has been done toward reestablishment of bighorns in Texas has been exclusively that by the Department.

Thank you for the opportunity to review and comment on these documents.

Sincerely,


CLAYTON T. GARRISON
Executive Director

TEXAS WATER DEVELOPMENT BOARD

MEMBERS

JOHN H. MCCOY, CHAIRMAN
NEW BOSTON

ROBERT B. GILMORE, VICE CHAIRMAN
DALLAS

W. E. TINSLEY
AUSTIN

MILTON T. POTTS
LIVINGSTON

CARL ILLIG
HOUSTON

A. L. BLACK
FRIONA

HARRY P. BURLEIGH
EXECUTIVE DIRECTOR



P.O. BOX 13087
CAPITOL STATION
AUSTIN, TEXAS 78711

May 29, 1975

AREA CODE 512
475-3571
1700 NORTH CONGRESS AVENUE

IN REPLY REFER TO:
TWDBP-0

General James M. Rose, Director
Division of Planning Coordination
Office of the Governor
P.O. Box 12428, Capitol Station
Austin, Texas 78711

Dear Jim:

Your memorandum of April 23, 1975 transmitted for review and comment the Soil Conservation Service's "Work Plan and Draft Environmental Impact Statement for Three Mile and Sulfur Draw Watershed Project, Culberson and Hudspeth Counties, Texas."

Following staff-level review of this proposed development, we find it will not interfere in any way with measures proposed in the Texas Water Plan. The diffused nature of storm water runoff from that particular area is difficult to control. A system of dykes, particularly above the City of Van Horn, together with a limited amount of flood control storage should afford a reasonable degree of protection. Similar treatment above the Wild Horse Farming Area will reduce damages from sheet erosion.

No objections are offered to the plan of development as presented.

Sincerely,

A handwritten signature in cursive script, appearing to read "H. Burleigh".

Harry P. Burleigh

RECEIVED

JUN 2 1975

STATE PLANNING
& DEVELOPMENT

TEXAS WATER RIGHTS COMMISSION

STEPHEN F. AUSTIN STATE OFFICE BUILDING

RECEIVED

JUN 2

STATE PLANNING
& DEVELOPMENT

AUDREY STRANDTMAN

SECRETARY

475-4514

COMMISSIONERS

JOE D. CARTER, CHAIRMAN
475-2453

DORSEY B. HARDEMAN
475-4325

BURKE HOLMAN
475-2451

May 29, 1975

Brigadier General James M. Rose
Director, Division of Planning Coordination
Office of the Governor
P. O. Box 12428, Capitol Station
Austin, Texas 78711

Attention: Mr. Wayne N. Brown

Re: U. S. Department of Agriculture,
Soil Conservation Service --
A. Draft Work Plan (DWP),
March 1975; and
B. Draft Environmental Impact
Statement (DEIS), March 1975
on Watershed Protection and Flood
Prevention, Three-Mile & Sulfur
Draw Watershed Project, Culberson
and Hudspeth Counties, Texas.

Dear General Rose:

In response to the request in your letter of April 23, the Commission staff has reviewed the referenced documents pursuant to the following:

1. Section 5, Part I of Attachment A to Office of Management and Budget Circular No. A-95 (Revised), effective January 1, 1974.
2. Section 102(2)(C) of the National Environmental Policy Act of 1969.
3. Water Resources Council's Principles and Standards for Planning Water and Related Land Resources.

RECEIVED

General James M. Rose
May 29, 1975
Page 2

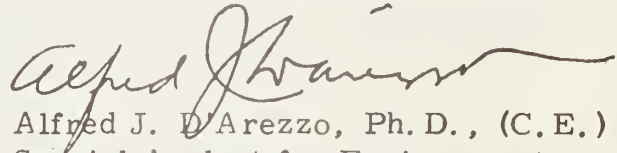
JUN 2

STATE PLANNING
& DEVELOPMENT

The staff finds that the referenced documents conform reasonably to the major analytic and administrative criteria of the above listed laws and regulations. The Addendum to the DWP outlining the benefits and costs of the structural features (i. e. , two floodwater retarding structures and a floodwater diversion) of the P. L. 566 project serves to enhance the document. However, some clarification is necessary whether the Soil Conservation Service intends to implement the entire \$3,660,000 Environmental Quality Plan described in Part III, Abbreviated Environmental Quality Plan of the Addendum. Specifically, are the non-P. L. 566 projects eligible for funding under the Rural Environmental Conservation Program?

Sincerely yours,

TEXAS WATER RIGHTS COMMISSION



By: Alfred J. D'Arezzo, Ph. D., (C. E.)
Special Analyst for Environment
and Interagency Coordination

AJD:ll

TEXAS FOREST SERVICE



File 5.321233

College Station, Texas 77843
May 14, 1975

Mr. Wayne N. Brown, Chief
State Planning And Development
Office of the Governor
Division of Planning Coordination
P. O. Box 12428, Capitol Station
Austin, Texas 78711

Attn: Leon A. Willhite

Dear Leon:

Your letter of April 23, and draft copies of the Work Plan and Environmental Impact Statement for the Three-Mile & Sulphur Draw Watershed Project have been received.

Little or no mention is made in the Work Plan draft on the use and appropriateness of planted windbreaks throughout the watershed. They are especially appropriate for the City of Van Horn as greenbelts, in parks, and other public and privately owned recreational areas for improving the quality of the environment as well as along major arterial highways for reducing noise pollution. In addition, generous plantings of windbreaks around ranch headquarter areas would do much to enhance the quality of life for the operators and inhabitants of those ranches. Secondly, they would perhaps contribute as much or even more to the social well-being of the area as the in situ watershed project measures themselves.

Sincerely,

Maosn C. Cloud

Maosn C. Cloud
Head, Forest Environment Dept.

MC/jc
cc: Southeastern Area, USFS
Atlanta and Jackson



EDMUND L. NICHOLS
Assistant Commissioner

May 2, 1975

Mr. Wayne N. Brown, Chief
State Planning and Development
Office of the Governor
State Capitol
Austin, Texas

Dear Mr. Brown:

This is in reference to your letter of April 23, 1975, requesting review of and comment on the Work Plan and Draft Environmental Impact Statement for Three-Mile and Sulfur Draw Watershed Project, Culberson and Hudspeth Counties, Texas.

These documents are very well written and appear to be comprehensive. Unfortunately, there are a few inconsistencies. For example, the population of Van Horn in 1970 is given on page 15 and 26 of the Work Plan and the figures given are about 20% different. These documents need to be carefully edited to correct these inconsistencies.

Overall, the plan appears sound and certainly in these times of food shortages efforts such as this to restore agricultural lands have our support.

We appreciate the opportunity to review these documents.

Sincerely,

A handwritten signature in cursive script that reads "Edmund L. Nichols".

Edmund L. Nichols

eIn/db

TEXAS INDUSTRIAL COMMISSION

714 Sam Houston State Office Building 512-475-4331 Box 12728, Capitol Station, Austin, Texas 78711 Telex No. 776-4



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Brownsville

James H. Harwell
Executive Director

MEMORANDUM

TO: Leon Wilhite
State Clearing House Coordinator

FROM: Phyllis Procter, Manager *PP*
Research & Program Development, TIC

SUBJECT: Draft Work Plan & EIS for Three-Mile and Sulphur Draw
Watershed Project (Culberson and Hudspeth Counties)

DATE: April 28, 1975

Although there seem to be only positive environmental effects generated by the Three-Mile and Sulfur Draw Project, it appears that more populous, crop-growing regions of the state would make greater gains from the expenditure of \$3,600,000.

njg



TEXAS STATE SOIL AND WATER CONSERVATION BOARD

1018 First National Building
Temple, Texas 76501
AREA CODE 817. 773-2250

June 2, 1975

Mr. Wayne N. Brown, Chief
State Planning & Development
Office of the Governor
Division of Planning Coordination
P. O. Box 12428, Capitol Station
Austin, Texas 78711

Dear Mr. Brown:

A copy of the work plan and draft environmental impact statement prepared by the Soil Conservation Service for the Three-Mile and Sulfur Draw Watershed Project has been forwarded for our review and comment.

We have had numerous opportunities to become thoroughly acquainted with this project and its sponsors since receiving their application for assistance under the Watershed Protection and Flood Prevention Act on July 20, 1964. Members of our staff and the State Soil and Water Conservation Board gave assistance to the sponsors on several occasions in the process of getting all in order for planning assistance. Since recommending the project to the Soil Conservation Service for planning by board action on May 21, 1968, we have continued to follow work plan development quite closely. Our involvement in this project leads to our full concurrence in the work plan and our opinion that the environmental statement adequately discloses the project's impacts.

Thank you for the opportunity to express our views.

Sincerely yours,

A handwritten signature in cursive script that reads "Harvey Davis".
Harvey Davis
Executive Director

HD/lc

TEXAS WATER QUALITY BOARD

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EXECUTIVE DIRECTOR

PH. (512) 475-2651

1700 NORTH CONGRESS AVE. 78701
P.O. BOX 13246 CAPITOL STATION 78711
AUSTIN, TEXAS

May 27, 1975

Re: Work Plan and Draft
Environmental Impact Statement
Three Mile and Sulphur Draw
Watershed Project

General James M. Rose, Director
Division of Planning Coordination
Office of the Governor
P. O. Box 12428, Capitol Station
Austin, Texas 78711

Dear General Rose:

The staff of the Texas Water Quality Board has reviewed the March, 1975 watershed work plan and draft environmental impact statement for the Three-Mile and Sulphur Draw watershed protection and flood prevention project in Culberson and Hudspeth Counties referenced above and finds that the water quality conditions and matters have been adequately addressed in the draft statement. We have noted the inclusion of the Abbreviated Environmental Quality Plan in the Addendum to the work plan that summarizes the environmental effects that would result from installation of the proposed work plan. We have also noted the provisions made for the protection against soil erosion and water pollution both during and after construction of the project.

We appreciate the opportunity to review this project. If we can be of further assistance to you, please let us know.

Very truly yours,

Emory G. Long

Emory G. Long, Director
Administrative Operations

cc: Edward E. Thomas, SCS
TWQB District 10



COMMISSION

REAGAN HOUSTON, CHAIRMAN
DEWITT C. GREER
CHARLES E. SIMONS

TEXAS HIGHWAY DEPARTMENT
11TH AND BRAZOS
AUSTIN, TEXAS 78701

STATE HIGHWAY ENGINEER
B. L. DEBERRY

May 21, 1975

IN REPLY REFER TO
FILE NO.

D-5

SUBJECT: Work Plan and Draft Environmental Impact
Statement for Three-Mile and Sulphur Draw
Watershed Projects, Culberson and Hudspeth
Counties

Mr. Wayne N. Brown, Chief
Intergovernmental Relations.
Division of Planning Coordination
Office of the Governor
P. O. Box 12428, Capitol Station
Austin, Texas 78711

Dear Sir:

We have reviewed the Work Plan and Draft Environmental
Impact Statement for the Three-Mile and Sulphur Draw
Watershed Project, Texas submitted by your letter of
April 23, 1975.

Our review indicates that this project by the Soil
Conservation Service will have no adverse effect on our
existing highways or planned highway improvements. Thank
you for the opportunity to review the statements.

Sincerely yours

B. L. DeBerry
State Highway Engineer

By: *Wayne Henneberger*
Wayne Henneberger
Bridge Engineer



THE UNIVERSITY OF TEXAS AT AUSTIN
BUREAU OF ECONOMIC GEOLOGY
AUSTIN, TEXAS 78712

University Station, Box X
Phone 512—471-1534

May 6, 1975

Mr. Wayne N. Brown, Chief
Division of Planning Coordination
P. O. Box 12428
Austin, Texas 78711

Dear Mr. Brown:

The staff of the Bureau of Economic Geology has reviewed the following:

- (1) Draft Environmental Statement
Harris County; Beltway 8, Section 2
- (2) Amendment to the plan of action on the Draft
Environmental Statement, Galveston Harbor and
Channel, Texas, Maintenance Dredging.
- ✓(3) Work Plan and Draft Environmental Impact Statement
for Three-Mile and Sulfur Draw Watershed Project;
Culberson and Hudspeth Counties, Texas.

We have no negative comments on these projects.

Thank you for the opportunity to respond.

Sincerely,

A handwritten signature in cursive script, appearing to read "Charles G. Groat", written over a horizontal line.

C. G. Groat
Acting Director

CGG:wll



TEXAS AIR CONTROL BOARD

PHONE 512/451-5711
8520 SHOAL CREEK BOULEVARD

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WILLIE L. ULICH, Ph.D., P.E.
JOE C. BRIDGEFARMER, P.E.

May 1, 1975

Mr. Wayne N. Brown, Chief
Intergovernmental Relations
Office of the Governor
Division of Planning Coordination
P. O. Box 12428, Capitol Station
Austin, Texas 78711

Dear Mr. Brown:

In regard to the Work Plan and Draft Environmental Impact Statement for Three-Mile and Sulfur Draw Watershed Project, Culberson and Hudspeth Counties, we have no additional comments to make concerning this project other than those in our letter of January 16, 1975.

Thank you for the review opportunity. If we can be of further assistance, please contact me.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Bill Stewart".

Bill Stewart, P.E.
Director
Control and Prevention

cc: Mr. Sabino Gomez, Regional Supervisor, El Paso



Texas Historical Commission
Box 12276, Capitol Station
Austin, Texas 78711
Truett Latimer
Executive Director

December 11, 1975

Mr. George C. Marks
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
P.O. Box 648
Temple, Texas 76501

Re: Three-mile and Sulphur Draw Watershed
Archeological Resources Evaluation

Dear Mr. Marks:

In response to your request concerning the above-referenced project area, we have examined the evaluation and find that no sites identified in the evaluation as eligible for inclusion within the National Register of Historic Places will be effected. The State Historic Preservation Officer concurs in these findings. Therefore, the project will not affect sites on the National Register nor any presently in the process of submission to the Register.

Thank you for the opportunity to participate in this consultation. If we may be of further service, please advise.

Sincerely,

Truett Latimer
State Historic Preservation Officer


By

A handwritten signature in cursive script that reads "Alton K. Briggs".

Alton K. Briggs
Archeologist

AKB:pc

cc: Mike Bureman
S. Alan Skinner



WEST TEXAS
COUNCIL OF
GOVERNMENTS

1200 NORTH MESA EL PASO, TEXAS 79902

(915) 544-3827

E. RAY HILL
Executive Director

May 12, 1975

Mr. Edward E. Thomas
State Conservationist
Soil Conservation Service
First National Bank Building
Temple, Texas 76501

Re: Three-Mile and Sulfur
Draw Watershed Work Plan

Dear Mr. Thomas:

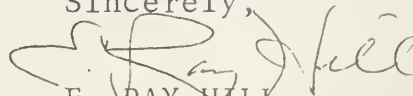
The West Texas Council of Governments has received the above-captioned plan for review and comment in accordance with OMB Circular A-95 and the National Environmental Policy Act of 1969.

The original draft of the plan was reviewed and favorably endorsed by our Board of Directors on February 21, 1975, and our comments were forwarded to you on February 25th. There does not appear to be any substantial change in the revised draft plan; therefore, we would like to restate our previous endorsement of the project at this time.

We would like to suggest, however, that in the final draft, some explanation should be provided for the inclusion of the Environmental Quality Plan in the Addendum. After discussing this matter with your office, we now understand that the Environmental Quality Plan was added as a result of recent Federal guidelines and that it does not materially alter any part of the Watershed Work Plan. Our initial reading of Page A-13 of the Environmental Quality Plan, however, led us to the mistaken conclusion that the Work Plan had been revised to include the establishment of a 10,000 acre wildlife refuge and the paving of 110 miles of county and private roads. As presently written, this portion of the plan is extremely misleading to someone who is unfamiliar with the "Principles and Standards" of the Water Resources Council.

We appreciate your keeping us informed of the progress of this project.

Sincerely,



E. RAY HILL
Executive Director

ERH/bg

CC: Judge John Conoly
Leon Willhite, DPC

SOUTHWESTERN REGIONAL OFFICE
John L. Franson, Representative
Louisiana
New Mexico
Texas
(Mexico)



NATIONAL AUDUBON SOCIETY

2507 ROGGE LANE, AUSTIN, TEXAS 78723 — PHONE (512) 928-2047

July 10, 1975

Mr. Edward E. Thomas
State Conservationist
Soil Conservation Service
P.O. Box 648
Temple, Texas 76501

Re: Draft Environmental Statement for THREE-MILE AND SULFUR DRAW
WATERSHED PROJECT, Culberson and Hudspeth Counties, Texas

Dear Mr. Thomas:

We have reviewed your draft Environmental Impact Statement concerning the above named project and have referred this matter to our national chapter in the area, the El Paso-Trans Pecos Audubon Society. Attached are the comments which have been prepared by that chapter, particularly by Dr. Ben Everitt. These comments should also be interpreted as the comments of the National Audubon Society in this regard.

We would like to have these comments incorporated into any future reports and adverse effects of this project taken into consideration by the Soil Conservation Service in accordance with the National Environmental Policy Act.

Sincerely,

John L. Franson
Southwest Regional Representative

Enclosure

cc: Council on Environmental Quality
Environmental Protection Agency
U.S. Department of the Interior
U.S. Fish and Wildlife Service, Albuquerque
Texas Parks and Wildlife Department
Texas General Land Office
National Marine Fisheries Service, NOAA, St. Petersburg, Florida
National Audubon Society
El Paso-Trans Pecos Audubon Society



NATIONAL AUDUBON SOCIETY

2507 ROGGE LANE, AUSTIN, TEXAS 78723 - PHONE (512) 928-2047

Comments on Draft Environmental Impact Statement
USDA - SCS Three-Mile and Sulfur Draw Watershed Projects

Summary:

Several additional environmental effects of the proposed project could or should have been considered, both on the favorable and unfavorable side.

One of the possibly most damaging aspects of the proposed project is the possible adverse effect on the natural recharge of the groundwater aquifer upon which the farming economy of the Van Horn area depends. Further study of this aspect of the project is recommended before implementation.

Comments on specific environmental effects:

The effects of the proposed project listed on pages 55 through 58 of the draft statement, appear to be weighted toward the "favorable" side BY INCLUSION OF questionable items and redundancy under "favorable environmental effects" p. 55-56, while several adverse effects have been omitted from consideration (p. 57). In particular, items 2 through 9 on p. 55 contain some redundancy; items 5 and 9 repeat items 2, 3, and 4, and item 7 repeats item 6, giving the impression that the proposed project has more beneficial effects than is really the case.

Regarding item 10-d (p. 56), The extent to which floodwater retarding structures will improve the nesting habitat of birds is doubtful. Species presently inhabiting the area are presumably well adapted to seasonal flooding, which for most species does not occur during the nesting season. From the data supplied, it is clear, only that the structures will cause a change in nesting habitat of an unknown sort, and upset the existing natural balance to a certain extent. This item should properly be listed under "adverse effects" rather than under beneficial effects.

Items 12, 13, 14, and 15 pertain to social and economic benefits and should not be included in environmental considerations. If included, the local economic benefits due to infusion of federal money for project construction and maintenance should be offset by reference to the adverse economic effects on the rest of the country due to increased tax burden and inflation.

An environmental effect not considered, but which might be added to the "favorable" column is that full implementation of the proposed project will increase the ecological diversity of the project watershed by providing ephemeral wetland habitat which does not presently exist, and presumably permitting the colonization of the watershed by species which are not now found there.

Adverse effects:

The three items listed on p. 57 under "adverse environmental effects" pertain for the most part to the temporary or ephemeral effects of the construction of the floodwater retarding structures, and not to the long-term effects upon the ecology of the watershed.

Several important effects have been omitted:

1) Probably the single most damaging aspect of the proposed floodwater retarding structures is the effect which they will have upon the groundwater hydrology of the Van Horn area, an analysis of which is omitted from the present draft statement. By reducing the spread of storm runoff and by reducing its velocity, in all likelihood groundwater recharge will be reduced and evapotranspiration of water at the surface increased, which will produce an adverse effect on the quantity and quality of water available to irrigators, probably within the 100-year amortization period of the project. The three-paragraph discussion of groundwater (p. 25) is vague at best, although admitting that recharge does occur during the summer flooding of ephemeral watercourses which the project is designed to stop. The one-sentence description of the surface deposits presumably involved in aquifer recharge

(p. 23) is inadequate. A thorough discussion of local characteristics of groundwater recharge is recommended. Such a discussion should include stratigraphic data from available well logs, estimates of porosity, permeability, and recharge capability of alluvial sediments, estimates of the velocity and direction of flow in the aquifers involved, and estimates of the reduction of available recharge area due to project implementation. Estimates should be provided of the increased evapotranspiration expected from the increased density of vegetation in and downstream from the floodwater retarding structures.

2) By placing floodwater retarding structures on the two major drainages in the project area, the depth, velocity, and duration of surface flow in approximately twelve miles of natural drainage will be severely altered. These are the only large drainages in the project area, and they and their associated riparian habitats are a unique part of the project environment.

Only a superficial analysis is given to this aspect of the surface hydrology and its influence on the ecology of the watershed (p. 19). No data are provided on the acreage of vegetation presently subjected to flooding from Three-Mile and Sulfur Draws outside of the farming area, on the flora and fauna of this particular environment, or to what extent this flora and fauna differ from that

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of the adjacent upland not subjected to flooding. No estimate is provided of the probably changes in vegetation, wildlife, and specific wildlife habitat due to the cessation of seasonal flooding, beyond projections of increased vegetation density and improved habitat for a rather vaguely defined group of "ground-nesting birds and other low-land game species" (p. 51).

Benjamin L. Overitt
704 New York Ave,
El Paso, Texas 79902

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